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Original Communications

POSTOPERATIVE ATELECTASIS

REPORT OF A CASE, PROMPTLY RELIEVED BY SIMPLE MEASURES

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R. K., five years old, had an afebrile grippal infection when symptoms of acute appendicitis occurred. On admission into the Evanston Hospital, Nov. 9, 1936 (6 P.M.), the temperature was 100° F.; pulse, 90; respirations, 22. Rigidity and localized tenderness were present in the right lower quadrant; the white cell blood count was 15,000; the urine was normal. An acutely inflamed retrocecal appendix (distal third necrotized and fibrin-covered) was removed by Dr. Frederick Christopher, within an hour after admission. The peritoneum was closed without drainage, a Penrose tube was inserted down to the peritoneum. Postoperative temperature was 100° F.; pulse, 90; respirations, 28. The patient's position was changed several times during the night; he slept well.

Suddenly, on the following morning (7 A.M.) the breathing became labored. The temperature reached 104° F.; the pulse, 140; the respirations, 48. The face was flushed; cyanosis was absent. Breath sounds could not be heard over the lower third of the right chest; the percussion note was flat; the heart deviated to the right. A diagnosis of postoperative atelectasis was verified by roentgenography (portable) (Fig. 1).

He was rolled upon his unaffected (left) side; steam-tent inhalations were instituted; the foot end of the bed was raised several inches; and intermittent administration of $O\text{-}CO_2$ by gas machine was started by 10 A.M. His general condition, and the findings upon auscultation and percussion, remained unchanged. In the region of greatest dullness, just

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Fig. 1.—Roentgenogram shows postoperative atelectasis of right middle and lower lobes (four hours after its inception).

Fig. 2.—Seven hours later; several hours after treatment was instituted, an obliterating mucous plug was coughed up and the atelectatic lobes promptly reinflated.

below and median to the right scapular angle, a clenched left fist was firmly pressed, and several short, rather forceful blows with the flat, right palm were directed against the fist. This thumping was repeated several times during the next hours.

For two hours, mucus was discharged very profusely from nose and mouth; then, a gelatinous, hemorrhagic, somewhat inspissated mucous plug, about the diameter of a pencil, was coughed up and expectorated. As soon as the bronchial occlusion was released, the atelectatic middle

Fig. 3.—A week later; only a slight deviation of the heart persists.

and lower lobes reinflated. He immediately said he felt much better, could breath with ease, and, for the first time, asked for water. Another picture (Fig. 2) was taken six hours after the first. By evening the temperature was 100° F.; the pulse, 90; the respirations, 36. He made an uneventful recovery (Fig. 3) and left the hospital on the tenth day.

Smears of the mucous plug, stained by Neufeld rapid typing method, showed Group B. pneumococci; culture on blood agar plates showed *Streptococcus hemolyticus, Streptococcus viridans* and pneumococci in abundance.

A CLINICAL EVALUATION OF THE HORMONE TREATMENT OF CRYPTORCHIDISM

An Analysis of 39 Cases

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In 1932 we[1] were impressed by the correction of cryptorchidism complicating endocrine dysfunction in three boys following the injection of anterior pituitary-like hormone from pregnancy urine. This work was initiated by the experimental work of Engle,[2] who used the *Macacus rhesus* monkey for his subjects. He found that the injection of pregnancy urine extract caused premature descent of the testes, growth of the testes, and increase in scrotal turgescence in the immature animals.

During the past four years there have been numerous reports concerning the hormone treatment of cryptorchidism,[3] all more or less in favor of this form of therapy. As a result there has developed considerable scepticism, especially among the surgeons, as to the value and limitations of this method of therapy.

Table I

Analysis of Patients

AGE, YR.	NO.	CONSTITUTION		UNILATERAL	BILATERAL	COMPLETE DESCENT	PARTIAL DESCENT	COMPLETE FAILURE	SUBSEQUENT SURGERY	HERNIA
		NORMAL	ENDOCRINE							
2	1	1			1	1				
3	0									
4	1	1			1	1				
5	2	2		1	1	2				
6	2	1	1	2		1	1*			
7	3	2	1	2	1			2*	3	1
								1†		
8	4	1	3	1	3	4				
9	3	1	2		3	3				
10	6	1	5		6	5	1†		1	
11	6	2	4	1	5	4		1*	2	
								1†		
12	4		4	1	3	4				
13	3		3		3	2	1*		Contemplated	
14	3	1	2	1	2	1	1*	1†	1†	
15	1	1		1				1*	Contemplated	
Total	39	14	25	10	29	28	4	7	9	1
%		36	64	25.6	74.4	71.8	10	18.2	23	2.5

*Unilateral.
†Bilateral.

From the Children's Endocrine Clinic of the Michael Reese Hospital, Chicago.
Read before the International Postgraduate Medical Assembly of San Antonio, Tex., Jan. 28, 1937.

During the past four years we have treated and observed thirty-nine cases of cryptorchidism. In this report we wish to analyze our results and to consider the various factors concerned in the treatment (Table I).

PREPARATIONS USED AND MODE OF ADMINISTRATION

Until the past year all of our patients were given hypodermic injections of anterior pituitary-like hormone from pregnancy urine (antuitrin-S) or placenta ("A.P.L."). They received from 100 to 150 R.U. three times a week for periods of from three weeks to six months (900 to 7,200 R.U.) depending upon the age of the patients and the response to treatment. The majority of the successful results followed a total dose ranging from 2,500 to 3,500 R.U. Those patients who were given more extensive courses of treatment received rest periods of from four to six weeks.

During the past year we have also used anterior pituitary-gonadotropic hormone (anterior pituitary gonadotropic hormone, Parke, Davis & Co.; prephysin, Chappel; and maturity factor, Ayerst) in a few instances. However, in our limited experience, we do not believe that the pituitary hormone has any advantage over pregnancy urine and placental extract for the treatment of cryptorchidism.

RESULTS OF TREATMENT

Of the thirty-nine patients treated, complete descent occurred in 28 (71.8 per cent), partial descent in 4 (10 per cent), and failure of descent was the result in 7 (18.2 per cent). Classified according to whether unilateral or bilateral, the results are as follows (Table II):

TABLE II

RESULTS OF TREATMENT—UNILATERAL AND BILATERAL CRYPTORCHIDS

	NO.	PER CENT	COMPLETE DESCENT	PER CENT	PARTIAL DESCENT	PER CENT	FAILURE OF DESCENT	PER CENT
Unilateral	10	25.6	3	30.0	3	30.0	4	40.0
Bilateral	29	74.4	25	86.0	1	3.4	3	10.6
Total	39	100.0	28	71.8	4	10.0	7	18.2

1. Unilateral (10 cases); complete descent 3 (30 per cent); partial descent 3 (30 per cent), and failure of descent 4 (40 per cent).

2. Bilateral (29 cases); complete descent 25 (86 per cent); partial descent 1 (3.4 per cent), and failure of descent 3 (10.6 per cent).

Seven patients have been operated upon; three were bilateral cryptorchids, two of whom revealed clinical evidence of primary pituitary insufficiency with atrophied testes. In two of the four unilateral cryptorchids the testis was absent at operation. Mechanical obstruction (adhesions and hernia in one case) was present in the other bilateral and

two unilateral cases. Operation is contemplated in two other patients (unilateral cryptorchids) unsuccessfully treated.

Unfavorable Reactions.—In this entire group of cases treatment was discontinued in only one instance due to an unfavorable reaction. One patient complained of rather severe headaches before the injections were discontinued. Local reactions were not unusual but were not severe. Local redness, pain, and occasionally swelling occurred around the site of injection, all disappearing in from twelve to twenty-four hours. Local gangrene or Arthus' phenomenon has not been observed. Occasionally there was a slight elevation of temperature for a few hours.

Untoward Effects of Treatment on Sexual Development.—At the present time we have not seen untoward effects from administration of hormone. Some of our children have been followed for over four years, and precocious development, or the converse, testicular degeneration and eunuchoid state, has not been observed. Also, we have not heard of symptoms referable to prostatic hypertrophy which has been mentioned as a possible complication of hormone therapy.

Effect Related to the Appearance of Secondary Sex Characteristics.—It has been our experience that the injection of anterior pituitary-like hormone or anterior pituitary sex hormone (in the amounts that we administered) does not accelerate the appearance of the secondary sex characteristic in boys before the age of puberty. In the boys approaching, or at the age of, puberty, hormone therapy in many instances resulted in the appearance of secondary sex characteristics as the cryptorchid state was corrected. This was true, particularly for the bilateral cryptorchids associated with endocrine dysfunction (hypopituitary type). In the more severe types of endocrine dysfunctions anterior pituitary-like hormone alone usually does not cause an appearance of the secondary sex characteristics.

Effect of Correction of Cryptorchidism Upon Personality.—Many of our bilateral cryptorchids, especially those with an existing endocrine dysfunction, presented various abnormal psychologic reactions and interesting personality traits. Many were shy and timid, did not mix well with other boys, exhibited behavior problems, and showed definite feminine likes and dislikes. Some developed inferiority complexes. Following correction of their abnormality those characteristics frequently disappeared. A more detailed psychologic study of a group of these boys before and after treatment is being carried on by our Children's Psychiatric Clinic.

Effect of Treatment Upon Weight, Growth, and Metabolism.—As stated in a previous communication,[1] it has been our experience that anterior pituitary-like hormone primarily has no effect upon weight, obesity is not influenced, and growth of stature does not occur other than as a secondary reaction as testicular function is restored or im-

proved. The effect of hormone therapy upon the basal metabolic rate and carbohydrate metabolism was too variable to draw definite conclusions.

Refractiveness to Treatment: Antibodies or Antihormones Resulting from Long-Continued Therapy.—As previously mentioned, it has been our experience that the majority of patients respond to from 2,500 to 3,500 R.U. of hormone and that further administration is usually superfluous. A failure of response to this amount of hormone may be interpreted as meaning a mechanical obstruction preventing descent of the testes, a congenital hypoplasia of the testes, a state of tissue refractiveness of ineffectiveness of hormone due to the production of antihormones or antibodies.[4, 5] Present investigations failed to reveal the presence of either antihormone or antibody production in the blood serum of our patients having received graded doses of anterior pituitary-like hormone.[6]

DETERMINATION OF PITUITARY GONADOTROPIC HORMONE IN THE URINE AS AN AID IN THE SELECTION AND DIFFERENTIATION OF CASES

By a quantitative study of the pituitary gonadotropic hormone content of the urine before and after treatment (thirteen of our more recent patients), we believe that we have available a test which is a valuable adjunct in determining the type of case suitable for treatment. Normal young children show excretion of gonadotropic hormone. This indicates normal anterior lobe pituitary activity and immature testes. As puberty is approached and the testes mature, the hormone disappears from the urine. To summarize this work which was reported in detail elsewhere,[7] it may be stated that bilateral cryptorchidism physiologically results in a phenomenon similar to castration; namely, that in the presence of a functionally active hypophysis, the circulating pituitary sex hormone is excreted in appreciable amounts in the urine. In cryptorchidism the testes eventually become atrophied and do not utilize all or any of the circulating hormone, whereas in the castrate the hormone is directly excreted. The absence of the hormone in the urine of bilateral cryptorchidism, therefore, signifies either a primary pituitary insufficiency or the presence of a normal pituitary, and testes still functionally able to utilize the hormone. In primary pituitary insufficiency clinical and other laboratory evidence is usually present which justifies such a diagnosis. In unilateral cryptorchidism sex hormone is usually absent in the urine, as one normal testis is adequate to utilize the available circulating hormone. This signifies that a lack of circulating hormone is not the cause but that a mechanical obstruction to spontaneous descent of the testis may exist. In many of these cases, therefore, we would not expect satisfactory results with hormone therapy.

Following descent of the testes with growth and their development, pituitary sex hormone gradually disappears from the urine. This phenomenon holds true whether the correction is accomplished by hormone or surgical means.

By determination of the hormone content of the urine, therefore, we are able in many cases to indicate the presence of adequate secretion of sex hormone by the pituitary gland, the relative functional state of the testes, and, accordingly, what may be expected from hormone therapy.

DISCUSSION

Of the 39 patients forming the basis for this report 29 (74.3 per cent) were between the ages of eight and fourteen years. In other words, the greatest number of patients treated were approaching the preadolescent or adolescent period.

Twenty-five (64 per cent) presented definite evidence of endocrine disturbance. Of these, 19 had bilateral and 6 had unilateral cryptorchidism. This would lead to the conclusion that bilateral cryptorchidism is most frequently associated with, or is a complication of, an endocrine dysfunction. Since the majority of our patients with endocrine constitutions were of the hypopituitary type, a physiologic explanation for the cryptorchidism may be hypothesized in many instances; namely, a dysfunction of the pituitary gland and subsequent dissociation of the normal hypophyseal-gonadal-hormone balance essential to the normal descent and development of the testes. Our hormone studies of one-third of our patients, previously referred to, aided us in determining one phase of the physiologic activity of the hypophysis and the gonads. We were able to ascertain in many cases whether or not the hypophysis was secreting gonadotropic hormone and whether or not the testes were functionally active in utilizing available circulating hormone.

A study of the figures referable to the results obtained by grouping the cases according to whether or not the cryptorchidism was unilateral or bilateral (Table II) deserves special consideration. It is interesting and significant to note that of the 10 unilateral cryptorchids, complete descent took place in 3 (30 per cent) as compared with descent in 25 (86 per cent) of the 29 bilateral cryptorchids. These figures further strengthen our belief that the presence of endocrine dysfunction in the presence of cryptorchidism suggests the probability of successful hormone therapy in a high percentage of cases. On the other hand, unilateral cryptorchidism is associated more often with the individual of normal constitution and usually signifies that a mechanical barrier to normal descent is present and that a hormonal factor is not at fault.

Of the entire group of 39 cases, only 7 patients have been operated upon (2 are to be operated upon). At operation, exploration failed to reveal the testes in two cases of unilateral cryptorchidism. Two bilateral cryptorchids presented clinical evidence of primary pituitary insufficiency, and at operation the testes were found to be hypoplastic. The other three patients revealed varying degrees of mechanical obstruction, and one case was further complicated by a hernia.

McLellan,[8] of London, who is a surgeon, reached similar conclusions in respect to the hormone treatment of cryptorchidism. He treated 25 patients between the ages of one and ten years (a considerably younger group than ours) and found that best results were obtained in bilateral cryptorchids of "subnormal physical development" and the poorest results were obtained in unilateral cryptorchids with normal physical development.

We also agree with McLellan's statement that, following surgical correction of the cryptorchid testes, a course of anterior pituitary-like hormone should be administered to bring about a more rapid and complete restoration of testicular development and function. His conclusion is based upon a five-to-ten year follow-up of 15 cases of cryptorchidism surgically corrected. In all cases the testes had remained well in the scrotum, but all were smaller than normal.

An argument that frequently arises opposing the early treatment of cryptorchidism (medical or surgical) is that many times spontaneous descent of the testes occurs at or after puberty. However, should we wait for spontaneous correction of an endocrine dysfunction and gamble on the possibility of the condition's becoming progressive? Then, Cooper has also shown that retrogressive changes occur in the testes of cryptorchids after from two and one-half to three years of age. Recently, MacCollum[9] demonstrated that spermatogenesis was faulty in many cryptorchids' testes surgically corrected in adulthood. The cosmetic and psychic factors must also be given consideration. The lack of development of the genitals and the obvious absence of the testes in many of the bilateral cryptorchids frequently has a decidedly bad influence upon the individual's personality.

CONCLUSIONS

The satisfactory results obtained by the hormone treatment in 71.8 per cent of 39 unselected boys with cryptorchidism lead to the conclusion that all cryptorchids should receive a trial course of hormone therapy before resorting to surgery. Furthermore, the resulting enlargement of the testes and their adjacent structures frequently lessens the difficulty of surgical procedures.

A total dose of from 2,500 to 3,500 R.U. of anterior pituitary-like hormone in any one single course is frequently adequate treatment. A failure of response with this amount of hormone usually signifies inevitable failure and justifies a discontinuation of the injections. When further therapy is indicated, however, intervening rest periods of from four to six weeks should be permitted in order to prevent the possible development of a refractory state.

SUMMARY

Thirty-nine unselected cryptorchids were treated by hypodermic injection of anterior pituitary-like hormone. Twenty-nine (74.3 per cent)

were between the ages of eight and fourteen years. Fourteen (36 per cent) were of normal constitution and 25 (64 per cent) presented evidence of endocrine dysfunction (hypopituitary type). Ten (25.6 per cent) of the cryptorchids were unilateral and 29 (74.4 per cent) were bilateral.

Complete descent of the testes occurred in 28 (71.8 per cent); 25 bilateral, 3 unilateral. Partial descent occurred in 4 (10 per cent); 1 bilateral, 3 unilateral. Seven (18.2 per cent) failed to respond to treatment; 3 bilateral, 4 unilateral. Seven patients have been subjected to surgery, and operation is to be performed upon 2 others.

A study of the urinary excretion of gonadotropic hormone is suggested as a valuable adjunct in determining the functional activity of the hypophysis and the gonads. There were no serious unpleasant untoward reactions resulting from therapy. Hormone therapy is a valuable adjunct to surgery, both pre- and postoperatively.

The authors are grateful to Miss Rita Neilson, R.N., of the Pediatric Clinic, for her cooperation and aid in the management of patients.

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104 SOUTH MICHIGAN AVENUE

CLINICAL OBSERVATIONS ON GRIPPE AS SEEN IN PEDIATRIC PRACTICE

Report on 1,146 Cases

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MY INTEREST in the clinical manifestations of grippe* began in 1918, at which time, fresh from medical school, I had the opportunity of caring for several hundred patients of all ages, in the major epidemic of that year. Since that time attention has been repeatedly called to this subject because at various periods a similar disease of much milder severity has been observed. Whether one was justified in using the term "flu," in referring to these milder epidemics, has always been debatable. Certainly the many waves of similar infection seen since 1918 and 1919 have not carried with them any comparable mortality. This problem is somewhat obscured by the fact that it stimulates in many ways various diseases commonly grouped under the term "upper respiratory infections." Nevertheless, it is the purpose of this paper to attempt to clarify the clinical concept of grippe, and to demonstrate that it can be diagnosed with a fair degree of accuracy under the conditions of ordinary practice.

Until recently, opportunity to make such a report as this from private practice has not been available because it was impossible to select the records of all patients seen with this disease. In the past few years, however, all diseases seen in private practice have been routinely listed and cross-indexed, as reported in a previous article.[1] Each day's experience is recorded on a dictaphone, giving the name of the patient, the diagnosis, complications, and any observations of unusual interest. From this record, what might be termed a diary of practice is typed in duplicate. One of the sheets used has a gummed back, and material concerning each patient is cut from this sheet and pasted on his permanent record in the files. The other sheet is used in preparing a cross-index file of diseases and complications. By means of this system, a list of all the patients seen with the disease diagnosed grippe, as well as a list of the complications which occurred in each case and abbreviated clinical records, was made available.

Before presenting the results, it should be emphasized that this method of investigation has certain disadvantages as well as obvious advantages. The principal disadvantage is that the records, as compared with clinic

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*This term is synonymous with influenza in the author's judgment but is preferred because it does not carry with it the implication that it is caused by the influenza bacillus.

and hospital data, are incomplete in many of the minor details, such as temperature, pulse, respiration, the various evacuations, fluid intake, etc. In addition, the records here are of children in an extremely favorable economic status. The advantages are that it affords the only way of arriving at the incidence of diseases actually seen in practice, that it is a quick method of estimation of the frequency of various complications and of outstanding symptoms, that prognosis is accurately determined with great rapidity, and that such statistics represent an actual picture of the disease in all grades of severity rather than one of the more severe cases as seen in hospital figures.

THE MATERIAL

The material studied includes data relating to 1,146 cases, on which the diagnosis of grippe was made between February, 1930, and January, 1936. These 1,146 cases occurred in 845 different children. There were 222 second attacks in the same children, 58 third attacks, 15 fourth attacks, 5 fifth attacks, and 1 sixth attack.

It is necessary to detail the symptoms and observations which led to the diagnosis of grippe in this series in order that no misunderstanding may occur. These symptoms may be divided into three groups, those seen at the onset, those seen up to three days, and those developing in the subsequent course.

A. Symptoms and Observations at the Onset
   1. Chill or chilly sensation (this may have to be demonstrated by direct questions)
   2. Sudden fever
   3. Red conjunctivae
   4. Normal nasal and pharyngeal membranes
   5. Relatively slow pulse
   6. Toxic symptoms; frontal headache, prostration, malaise, vomiting, anorexia, flushed face (cyanosis rarely seen in children), muscular aches in older children only
   7. Leucopenia

B. Symptoms and Observations During First Three Days
   1. A fluctuating fever
   2. Reddening of nasal and pharyngeal membranes
   3. Cough—laryngeal in type
   4. Relatively slow pulse
   5. Coated tongue—often thickly furred, with sharply demarcated red rim
   6. Signs or symptoms of complications, usually in the ears or chest
   7. Modification of the blood count with purulent complications

C. Observations Made on the General Course of the Disease
1. Rapid recovery after a few hours, or
2. Prolongation for several days or weeks without demonstrable complications, or
3. Prolongation due to evident complications
4. Improvement, usually associated with a mucous discharge from nose, throat, and bronchi, and with progressive clearing of tongue
5. Tendency to relapse, following apparent recovery

DIAGNOSIS

In the presence of an epidemic, the diagnosis of this disease is usually easy. The history of exposure to other cases plus the presence of typical symptoms, leaves little room for doubt as to the nature of the ailment. However, one must be on his guard continuously against jumping at conclusions and must rule out other respiratory infections by careful physical examination. It is important to remember that the incubation period is in the neighborhood of one week and that the disease is usually passed on to the children by adults in the family group. School and playmate exposure are less frequent, because the sudden onset puts the patients immediately to bed before they have an opportunity to spread the disease among their fellows.

During periods in which there is no epidemic, it may be necessary to make a diagnosis largely by exclusion, and the diagnosis is less certain. However, even at such times family exposure often helps the clinician. The sudden onset with conjunctivitis and with an otherwise negative examination on the first day, followed by subsequent appearance of cough and furred tongue, should suggest grippe. If leucopenia is found, the correctness of the opinion is substantiated. Sometimes the nature of the disease cannot be known with certainty until a typical complication, such as capillary bronchitis, appears. My records indicate that, for practical purposes, this condition occurs in only two diseases, measles and grippe. In general, it has been found that the diagnosis can be made if the above outlined symptoms are kept clearly in mind. Diagnosis is often corroborated when the patient transmits the disease to other members of the family.

THE CHRONOLOGIC INCIDENCE OF GRIPPE

The date on which each case was first seen was recorded and charted, as shown in the accompanying graph of monthly incidence (Chart 1). The results of this procedure are in many ways the most striking of the study, in that a sharply defined yearly epidemic of considerable proportion is demonstrated, except in the winter of 1933-34, when the wave was much smaller. Before making this graph, it was felt that periods of increased incidence of this disease would appear, but it was not suspected that any such regularity would be shown in the recurrences, or

that the epidemics would loom up as large as shown. In addition to these peaks, the chart shows the occurrence of sporadic cases in most months throughout the period of investigation.

Because of the frequency with which croupy cough, diagnosed laryngitis in these records, occurred with grippe, it was thought advisable to make a similar chart of the chronologic incidence of laryngitis (Chart 2). When these two graphs are superimposed (Chart 3), the result demonstrates convincingly that the peaks of grippe and laryngitis are identical and supplies evidence that the commonest cause of croup in

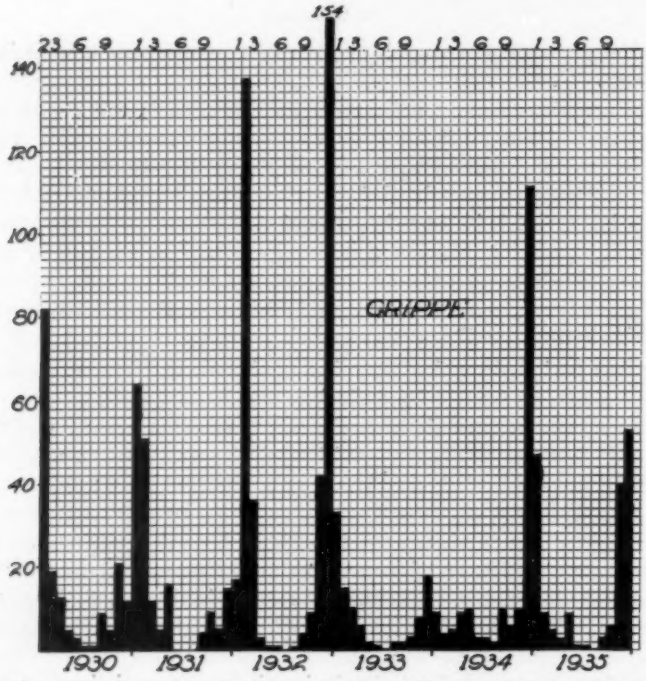

Chart 1.—The chronologic incidence of grippe. This graph demonstrates yearly epidemics of grippe, occurring in the winter months. The cases are tabulated by months, during the period from 1930 to 1936. The epidemic in the winter of 1933-34 was of much smaller proportion than the other epidemics.

childhood, is grippe. This agrees with the clinical fact that when the older members of the household contract typical grippe, the baby often has a croupy attack.

After these two graphs had been drawn, it was thought possible that they reflected merely the peaks of upper respiratory disease in each year. In order to demonstrate whether the graph representing the incidence of grippe was truly characteristic of that disease alone, or whether its peaks were merely components of a more general upper respiratory wave, it was decided to chart, in a similar manner, the inci-

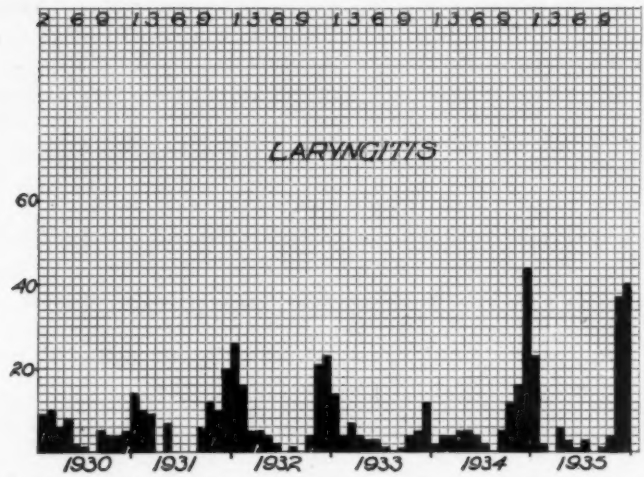

Chart 2.—The chronologic incidence of laryngitis. This graph represents the monthly incidence of laryngitis or croup, occurring over the same period of time.

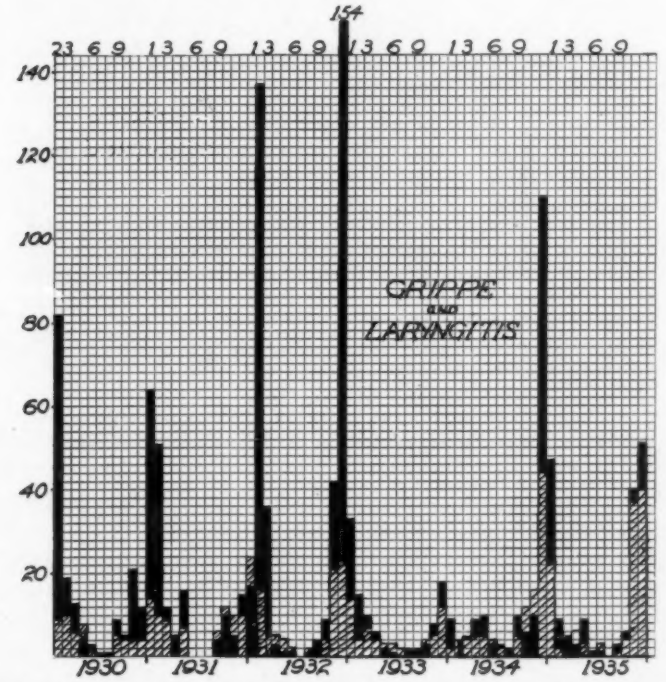

Chart 3.—In this chart the incidence of laryngitis is superimposed (cross-hatching) upon that of grippe. This demonstrates that the incidence is identical.

dence of the commonest diagnosis made in such waves, pharyngitis (Chart 4). It will be seen immediately that, according to this record, there is no relationship whatever between the incidence of grippe and laryngitis, on the one hand, and pharyngitis on the other. This is additional evidence in favor of the contention that grippe is a separate clinical entity and not a mere variant of ordinary upper respiratory infections.

THE AGE INCIDENCE

As encountered in this group of patients, grippe affected children of all ages, with no evident period of immunity. Fifty-two were less than one year of age. The most common ages involved were from four to six. This has no statistical value, however, because the period of from birth to six years is that in which the pediatrist sees most of his patients.

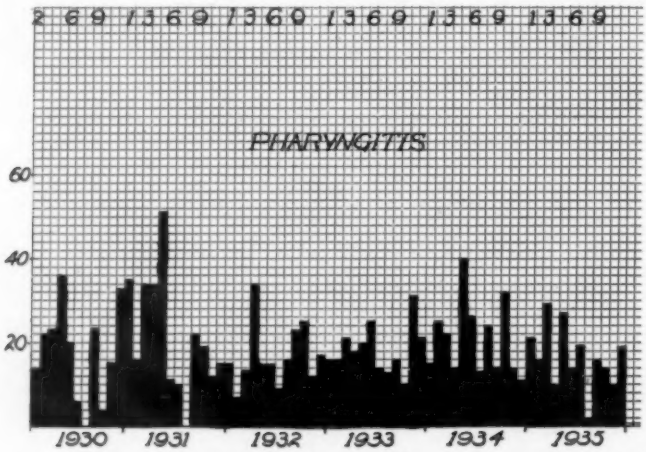

Chart 4.—The chronologic incidence of pharyngitis. This graph is presented to demonstrate that the incidence of pharyngitis, the commonest diagnosis made in ordinary upper respiratory infections, is in no way similar to that of grippe or laryngitis.

THE COMPLICATIONS

In order to study the complications of this disease, tables were made, listing each case with its complications. These tables, since there are so many cases, are too bulky for presentation here, but an attempt at summary will be made.

In the original compilation, conjunctivitis and laryngitis were considered the two most common complications of grippe. Subsequent consideration of this subject, however, has led to the feeling that these should be considered integral parts of the disease, rather than complications. This position was taken because both are, in some degree, present in most of the cases. This statement is strictly true if one agrees that the constant cough is due, at least in part, to laryngitis. Of course, it is

admitted that more than the larynx is involved. Perhaps it should be considered that the term laryngitis is synonymous with laryngotracheitis.

Neither of these symptoms, as I choose to call them, is of serious importance, although they are often most distressing to the patient. Discomfort on moving the eyeballs into extreme positions and the frontal headaches, so often complained of, may have their origin in conjunctivitis. There is seldom any purulent discharge from the eyes. The laryngitis is usually the most uncomfortable feature of this disease, disturbing sleep, and racking the patient with its constant bark. Possibly the persistence of this cough is a factor in the production of infections lower down the bronchial tree.

TABLE I

FREQUENCY OF COMPLICATIONS

	EARS	CASES	APPROX. PER CENT
Otitis media	338	221	19
Paracentesis	64		
Spontaneous rupture	17		
Total discharging	81		
Mastoiditis	17		
(Mastoids operated upon, 4)			
Capillary bronchitis		139	12
Pharyngitis		65	6
Bronchitis (upper)		39	3
Persistent vomiting		22	2
Pneumonia		19	1½
Cervical adenitis		19	1½
Diarrhea		12	1
Pleurisy		6	½
Tonsillitis		6	½
Ulcerative stomatitis		4	⅓
Sinusitis		4	⅓
Encephalitis		2	1/6
Hemorrhage		2	1/6
Agranulocytosis		1	1/12

Of the complications, otitis media and its sequelae, and capillary bronchitis are by far the most common ones seen. Table I gives the relative frequency of the complications.

Otitis media was diagnosed in 221 cases and involved 338 ears in these children. This diagnosis was made whenever the eardrums became fiery red or distorted, with or without complaint by the child. The ordinarily pink flush, so often seen in upper respiratory infections, was not so labelled. This incidence of otitis media in only one-fifth of the children was rather surprising to me, as I would have estimated that at least 50 per cent of the patients would show this complication.

Paracentesis was considered necessary in 64 of the 338 inflamed eardrums, and in 17 others the eardrums ruptured spontaneously. This makes 81, or about one-fourth of the infected ears, which discharged pus.

Seventeen of these 81 discharging ears showed symptoms or signs leading to the diagnosis of mastoiditis. Thus about one-fourth of the discharging ears involved the mastoid sufficiently to produce evidence of bone involvement. In only 4 of these mastoid infections was it deemed necessary to operate. Death occurred in one of these patients whose grippe was complicated by otitis media, then measles, mastoiditis, petrousitis, and meningitis.

Summarizing the data on otitis media, then, one might say that approximately one-fifth of the patients presented this complication, that of the inflamed ears one-fourth discharged, of these one-fourth developed mastoid symptoms, and of these one-fourth required operation.

Capillary bronchitis is the next complication in frequency, occurring in 139 instances. This complication is of considerable interest, because in my experience it is rarely encountered except in grippe and measles. The diagnosis of capillary bronchitis was made on physical signs alone. On examining the patient, relative dullness and very fine crackling râles were heard over an isolated area in the chest, usually in the posterior base. Sometimes blood-streaked mucus was expectorated by these patients. The course of this complication was accompanied by varying degrees of fever which was always highest at the onset and became less as the râles in the chest grew moist, leading to what has been termed the "bubbling spring" type of chest before complete recovery.

In tabulating capillary bronchitis, it was noted that many of these children were asthmatic, and an attempt to arrive at the exact percentage was made. It was found that 97, or 70 per cent of the children who developed this complication, had had at other times definite attacks of asthma. In 19 additional instances, the diagnosis of allergic child was probably correct, making it seem that about 87 per cent were of this type. It may be that this observation, that the majority of patients with capillary bronchitis were allergic, is significant, when it is recalled that none of these patients with what is ordinarily considered a severe pulmonary infection were at any time in actual danger, or seriously embarrassed. One wonders whether the physical findings leading to this diagnosis were entirely due to infection in the lung parenchyma, or if bronchial spasm was a factor in the production of this complication. None of these patients developed empyema or pleurisy.

Pneumonia was a less frequent complication, occurring in only 19 instances. This diagnosis was made when frank dullness, bronchial breathing, and rapid respiration were present. Pleuritic pain was present in 6 of these patients, but none of them developed frank empyema.

The other complications require little comment except to remark that "intestinal flu" was characterized by its infrequency, occurring in only 12 cases. The others are such as might be expected to occur in any infection located in the respiratory tract.

Cervical adenitis was of mild grade and caused little concern. Suppuration did not occur.

In addition to these complications of grippe, concomitant conditions were encountered, some of which were not in any way due to grippe, and in many of which it was more true that grippe was the complicating factor. In two instances each, appendicitis and mumps were encountered. Grippe also occurred with chickenpox, retropharyngeal abscess, cretinism, erythema nodosum, and whooping cough. In only one instance was pyuria noted and none of the patients developed nephritis, endocarditis, myocarditis, or arthritis.

PROGNOSIS

It seems rather striking that in this series of 1,146 cases, there was only one fatality, but it is not surprising in reality, because grippe is known to be less severe in children than it is in adults. In the severe and widespread epidemics of 1918 and 1919, only one child under my care died, and he had pulmonary tuberculosis before he contracted grippe. In the present series of patients, the one fatality occurred in a child who contracted measles during the course of grippe. It has been my observation that even in adults, when reasonably good nursing care was given from the onset, death occurred only in patients with chronic organic difficulties. It must also be remembered that the patients in this series form a selected group of children in a comparatively wealthy suburban community. Such children are usually given adequate nursing care from the beginning of their illness and are, in general, better physical risks than are children under less fortunate economic conditions.

It is of more than passing interest that none of these children developed nephritis, arthritis, or cardiac complications, and that pyuria developed but once. This certainly tends to place this disease in a separate category from that of the ordinary upper respiratory infections and to distinguish it sharply from the rheumatic type.

SUMMARY

1. A method of keeping records of diseases and complications seen in private practice is described.

2. Such records of 1,146 cases of grippe occurring between February, 1930, and January, 1936, form the basis of this report.

3. The symptoms of grippe and the diagnostic criteria are outlined.

4. During this period, grippe occurred in yearly epidemics of considerable proportions except in the winter of 1933-34, when there was an obvious, but much smaller, wave.

5. Laryngitis or croup occurred in smaller epidemics identical in time with those of grippe, making it seem probable that croup is a manifestation of grippe in infancy.

6. The epidemics of grippe showed no chronologic relation to the prevalence of general respiratory disease as shown by comparison with the incidence of pharyngitis.

7. The disease attacked children of all ages.

8. The complications were tabulated, and it was demonstrated that otitis media and capillary bronchitis were by far the most common.

9. Seventy per cent of the children who developed capillary bronchitis were known to be asthmatic, and another 17 per cent were probably allergic. This raises the question as to whether or not the physical findings leading to the diagnosis of capillary bronchitis were not due to an allergic reaction in the bronchi.

10. Complications conspicuous by their absence include endocarditis, empyema, nephritis, pyuria, and arthritis. It is evident that these conditions are not usually caused by grippe.

11. The prognosis was extremely good. The only death was from meningitis which resulted when measles complicated grippe with mastoiditis.

REFERENCE

1. C. A. Aldrich: Am. J. Dis. Child. 47: 1051, 1934.

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THE INVALID REACTION IN CHILDREN

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THE invalid reaction is the habit of complaining about somatic discomfort, though clinical and laboratory investigations fail to give evidence of a physical basis for the aches and pains experienced by the patient. Organically unfounded preoccupations and sensations are carried to a point at which the complainer no longer feels capable of going through the tasks and responsibilities of his daily routine. For all practical purposes, he is not less incapacitated than a person whose sufferings and disabilities derive from real bodily disease. He sincerely believes in the disturbing existence of the ailments that bother him; his attention is centered on the functioning of the organ or organs that seem to give him trouble. There are innumerable shades, transitions, and variations from occasional and transient complaints of headache, backache, stomach-ache, or palpitation to conditions of protracted, even lifelong abandon to helpless, resigned, forever moaning and groaning wheel chair invalidism.

Invalid reactions are found in people of every age. Sometimes their occurrence in adults can be traced to beginnings in the early years of life. Pediatricians are not infrequently confronted with children whose complaint habit has assumed sufficiently disturbing proportions to make the parents seek medical advice. Hypochondriac features of varying severity were the outstanding causes for referring approximately 5 per cent of all children sent for consultation to the psychiatric service of the Harriet Lane Home. All gradations were represented, from the well-known Monday morning headaches to the full-fledged invalidism of bedridden, frightened, almost completely inactive, little human wrecks who believed that only a few weeks or even days separated them from their graves. With them came bewildered, alarmed, careworn mothers, often enough surprised, if not disappointed, that their offspring had been sent to a psychiatrist instead of being rushed to an emergency ward.

Some of these patients were brought to the Harriet Lane Home soon after the onset of their complaints. Others were taken to the clinic as a last resort by parents who were not satisfied with their physicians' assertions that there was "absolutely nothing wrong" with the children. Still others had already accumulated vast experiences which resulted in a sad distortion of the patient's personality development and outlook on life. Tonsils and adenoids, even appendices had been removed to no avail or

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with only temporary success. Little boys and girls with healthy bodies had ingested enough medicine to fill the shelves of a medium-sized drug store, had been exposed to ultraviolet lamp treatments or had been sent for weeks or months to country homes, the mountains, or the seashore "for their health." Prescribed "rest cures" had kept them in bed, away from school and their playmates. They had learned to rattle off breathtakingly long diagnostic tongue twisters overheard in physicians' offices or at their bedside. They had been spoiled pathologically by parents obedient to the warning that under no circumstances should their sick darlings be crossed.

Richards,[1] who studied hypochondriac trends both in adults and children, found that the distressing symptoms of adults were in every instance "substitutes for psychobiologic material in the form of thwarted ambitions, petty jealousies, romantic disappointments, an empty and dissatisfied life, a desire to escape marital or domestic responsibilities, and many another unhappy ingredient of life's experience." She observed that the complaints of children were similar to those of the adult-invalid types: palpitation; shaking in the stomach; pain in the chest, abdomen, and legs; weakness; giddy spells; fullness in the epigastrium; vomiting; and "feeling all played out." These observations are supported fully by our own material. Complaints about the functioning of the digestive system are in the lead with regard to frequency; headache is next; then comes an assortment of painful sensations in various regions of the body: the legs, knees, feet, back, shoulders, arms, neck, throat, or ears. General fatigue with inability to play, go to school, do homework, and help about the house is complained of alone or in combination with the other ailments. The nature and type of the complaints are best illustrated by a few examples: One boy reported: "I do not know where to start. *Which* pains do you mean? It feels like pins and needles all over me. My legs hurt a little, I can't hardly move them; I guess it is the calves, that is where it pains. Sometimes my muscles hurt, my arms, my legs, and everything. Sometimes in school my head begins to throb. I have a backache when I write a long time or when I am leaning forward." This patient had a "cramp in the arm" during arithmetic lessons only. His mother's comment was: "He evidently *must* be suffering somewhere, or else he would not act this way. There is something somewhere that the doctors did not find out. I can't imagine that a child could put on so much." A thirteen-year-old girl offered a list containing headaches, dizzy spells, needles sticking in her heart, weak spells, choking feelings, shortness of breath, and pain in her jaw, the latter beginning at the time when her mother had suffered a dislocation of the mandible. A mother, who herself was addicted to hypochondriac headaches and backaches, was so overwhelmed by her child's miseries that she started out by implying that she felt inadequate to give an account of them: "I can hardly talk to you about

it. It is things that you see and hear but not talk about. She has headaches, terrible headaches, and backaches. I thought it was her kidneys but Dr. S. told me that her kidneys are all right but he found a very high nervous tension." Her initial assertion of her difficulty "to talk about it" was followed by a torrential effusion which took almost thirty minutes to run its course. One boy of eight had episodes in which the index and middle fingers of his right hand became stiff at home and at school, always while he was writing. He would "fool around" with these fingers and say: "Look, my fingers are stiff!" As soon as he was excused from further writing, his fingers became "all right again." During the first interview at the clinic, he stretched his fingers forward several times, shook them vigorously, and when nothing was said to him, volunteered: "See, I am nervous, *I* ain't shaking it. I wouldn't shake it. They didn't tell you I am nervous, did they?" A twelve-year-old girl displayed dramatic talent as she combined her wailing recital with genuine pleasure at the thought that she presented such an interesting story to the doctor. Said she: "I came here for my stomach. Sometimes, when I eat something, it sticks right by my chest. It sticks right here in my throat, and I can't swallow. When I weigh myself, I never gain. One week I weigh 63, and the next week I still weigh 63. When I bend down to pick up something, I vomit a little bit. And every time I go to the lavatory, I throw up a little bit. I have a headache. I have pain in my leg; I think it is the left; when I go to the lavatory, it gets real tired." When questioned whether she had pain in her arms, she said, after some hesitation: "No." On second thought, she added: "Not so much." After another pause, she said: "Sometimes it hurts me." A little later: "You know, sometimes I have a real bad pain." After another pause: "Something like rheumatism." And finally, as a climax, very pathetically: "You know, doctor, I think I *have* rheumatism in my arm." Another girl, whose palpitations, vomiting, anxiety attacks, and fatigue had persisted in spite of tonsillectomy, appendectomy, rest cures, and digitalis, was brought to the office in a wheel chair, wrapped in innumerable sweaters, coats, scarfs, and blankets; when asked what the trouble was, she whispered, with appearance of considerable effort as if those were her last words: "Doctor, I have an auriculo-valvular disease."

What is the basis of all such complaints of children who are objectively healthy as far as their somatic functioning is concerned? Under what circumstances do hypochondriac reactions begin? What are the things reacted to? How is the development of children's invalidism fostered, and how can it be checked? I may be permitted to introduce the answer to these questions with the detailed quotation of a specific case.

G. R. was referred for psychiatric consultation on Feb. 20, 1933, at the age of ten years and eight months. His family physician reported that "following

pneumonia in 1932, G. had been confined to bed every week from Sunday night to Thursday and was quite well from Friday to Sunday night.'' He could find ''no evident physical cause for the disability.'' The mother recited the following story:

''When he first started about five months ago, on Sept. 19, 1932, he had pain under his left shoulder. I called a doctor and he said it was pleural pneumonia. He kept him in bed for nine days. G. slept most of the time for three or four days, then he rallied. He did not have fever outwardly, the doctor said he had fever inwardly. He did not cough either, I can't understand that. He felt all right when he got up. While he was in bed, he ate well. The doctor told me his pulse was very slow then. He was up for two days, then he complained of pain in both legs under his knees. He went to bed again for about five or six days, and that pain disappeared; he had no fever. Then he got up, played for about three or four days, then he had those tired spells. He would go to bed and stay in bed for four or five days, sleeping most of the time. He can be waked very easily. But he seems so tired, doctor, he can hardly talk; it seems that all his strength is gone. He usually goes to bed on Sunday night and stays in bed until Friday afternoon, mostly every week, and he is all right from then till Sunday night.''

During the five months from September, 1932 to February, 1933, several physicians called in by the frantic mother ''diagnosed'' the child's condition successively as pleural pneumonia, rheumatism, tuberculosis, anemia, kidney trouble, coma, and lethargic encephalitis. One physician refused to diagnose the case; he stated that it was a puzzle to him, that it was so unusual that in his many years of general practice he had never seen anything like it before. G. was given aromatic spirits of ammonia, Upjohn's medicine ''to flush the kidneys,'' citrocarbonate, milk of magnesia, luminal, and other drugs. Forcing of fluids, one glass of water every half hour, was prescribed. He was to remain in bed for weeks at a time, undergoing a ''rest cure.'' Placement in a tuberculosis sanatorium was recommended because some one had found ''a spot on the lung''; the family refused to have him admitted. A neighbor, who had spent a long time in a hospital and therefore considered himself an expert in medical matters, came in every day, took the child's pulse and temperature, commented on the appearance of the urine and offered diagnostic and therapeutic suggestions of his own.

G. is the youngest of four children, all boys. Pregnancy, labor, and birth were normal. His mother was forty-two years old at the time of his birth and worried about his development and future health, having heard that ''change-of-life babies'' have less vitality and strength than children born of younger mothers. For this reason, he was overprotected from the beginning, whereas the three older boys had been reared sensibly. He was bottle fed until over two years of age. His minor illnesses, measles, mumps, chickenpox, whooping cough, and mild scarlet fever, all in preschool age, were major events in the life of the family. He was smothered with solicitude, affection, and indulgence. He was afraid of the dark and had temper tantrums. He learned to make full use of the mother's consternation over every one of his complaints. Soon after he had entered school, the mother decided that he was too delicate to attend; she took him to a physician, who said that ''G. was a little nervous and might as well be kept at home.'' He was kept out of school for a whole year. Frequent harping on abdominal pain led to an appendectomy when he was eight years old.

Physical examination, including roentgen ray, lumbar puncture, and tuberculin test, proved the boy to be healthy in every respect, except for a sty on the left eyelid and one carious molar. Psychometric rating showed that he had normal intelligence. He kept clinging to the mother's skirt during the entire procedure, and separation was accomplished with great difficulty. Fearing further tests, he preferred to say little about his complaints, but he knew of every ''diagnosis'' that had been given out regarding his condition. The social worker's investigation brought to light

that the family lived comfortably in a pleasant suburban section. They had a number of house pets, a dog, a cat, chickens, rabbits, and canaries. The father, an alcoholic of the mushy, sentimental sort, had managed to go unscathed and remain economically independent throughout the years of depression. The father, the mother, herself a hypochondriac of no mean proportions ("feels shaky inside," "coughs when excited," had in her twenties a "prostration" lasting two and one-half years), and the three older brothers had always hovered over G. whom they considered a sickly, delicate child. His brother, three years older than G., had always been "waiting on him like a girl."

The treatment began with an interview with both G. and his mother, during which the nature of the condition was explained to them frankly and simply. Criticism was avoided. It was taken for granted that the mother had a right to be concerned as long as she believed the child endangered by the fact that he was born shortly before her menopause, and to consider him sick so long as she thought him afflicted with rheumatic heart disease, pleural pneumonia, or encephalitis. For reasons of retaining their confidence in their private physicians, the patient and his mother were told that symptoms such as those shown by G. may well make one think of diagnoses of the kind offered to them, that indeed, we ourselves had not reached our conclusions until after a careful physical examination had been done. At this point an authoritative statement was made to the effect that, except for the sty and the carious molar, the child had been found to be physically healthy. The mother was satisfied that all necessary clinical and laboratory tests had been carried out. G. was unreservedly happy; for the first time in his life he heard himself spoken of as a healthy boy, capable of roller skating, riding on a bicycle, standing up for himself, going to school regularly, and associating normally with other boys of his age. The mother was then seen alone. She now realized that, though G.'s organs had been healthy, there had been something unwholesome about the family's and G.'s own attitude toward his health. The mother's own hypochondriasis was touched upon as something that had helped to furnish the pattern and needed straightening out; it was suggested that she herself submit to a physical examination. Her notion about change-of-life babies was dispelled. Her idea that the school was a sort of torture chamber where delicate children were overworked beyond their capacity was replaced by the knowledge that G. was physically and intellectually able to cope with the work of his grade. The mother took it upon herself to instruct the other members of the family accordingly. Then G. was seen alone. While in the waiting room, he had had time to think things over in the light of his new knowledge. He was ready to go back to school on the following day. He wished for a bicycle. He enthusiastically accepted the suggestion that he join one of the boy's clubs.

We then acted in accordance with a statement of Esther Richards, who says: "The best results are obtained when a visit to the home is made within twenty-four hours after the patient's first visit to the clinic. It is easier then to emphasize the advice of the physician and clear up any points that may not have been clearly understood in the diagnosis." Our social worker arrived at the house on the following morning, shortly before it was time to go to school. This visit proved to be of essential therapeutic significance. G. had tried valiantly to get ready for school but the old habit made its last stand. Another of his "tired, sleepy" episodes had set in. But this time the family showed no alarm. The social worker told G. that, if there still was doubt in his mind concerning his health, she would be glad to take him back to the clinic for a repetition of the examinations. G. got out of bed, at first languidly dragging one foot after the other. He then gathered momentum and left for school in due time. Ever since that morning, G. has been going to school regularly, making good progress. He has never since then complained about his health. He has taken part in the usual boys' activities. The family considers

and treats him as a normal, healthy, youngster. As a matter of fact, he at first tried to overdo somewhat but his mother, so much wiser now, gave him an opportunity to find his own pace. The father, uncomfortable at the thought that a visitor from the clinic might at any time see him in a state of intoxication, first reduced his drinking and then gave it up. G. has had a few mild colds during the past four years since the first clinic contacts; he and the family accepted those colds for what they were worth, without any ado.

This case contains a considerable number, though naturally not all, of the ingredients that may go into the making of the invalid reaction in children. In most of the 145 hypochondriac patients studied at the Harriet Lane Home, one finds a combination of characteristics rooted in the personalities of the children, influences exercised by domestic attitudes, examples and management, iatrogenic (i.e., physician-determined) factors, and situations which cause the children to derive more or less knowingly a gain from their physical complaints.

The majority of chronic complainers recruits itself from the ranks of the pampered and insecure. Not every child that is being spoiled is necessarily a spoiled child. There are children who do not lend themselves with complete resignation to parental overindulgence and overprotection. They sooner or later find a way of emancipating themselves from pampering usurpations. The development of a "spoiled child reaction" depends not alone on the tactics of the adults in the household but also on the personality of the child, who may or may not add self-spoiling to his emotional crippling on the part of the elders. The *spoiled* child who eventually acquires hypochondriac tendencies has usually started out with food capriciousness, bedtime strategies, and equally disturbing pranks with regard to toilet habits. His refusal to eat, go to sleep, and empty his bowels helps to center his own attention and that of his already solicitous family on the functioning of his body, and soon habitual gagging and vomiting, insomnia, and constipation may become major concerns and drive the child in the direction of invalidism. Having learned to use his appetite, sleep, and elimination as tools for absorbing the interests of his parents, he finds that other somatic complaints, aside from providing variety, aid in the continuance of his domination and check any real or anticipated let-up of the spoiling regime. The *insecure* child, in need of proofs of parental affection, may have discovered that nothing is so likely to cause his mother to occupy herself with him as is the complaint of physical discomfort. For this reason, one can occasionally trace the onset of hypochondriac tendencies to the time of the arrival of a new baby, doing away with the solitary position in the family of an only child. Under these circumstances, harping on somatic pains and aches sometimes is used by the child to retain as much as possible of the care and attention which now he must share with another sibling.

Of course, a child does not all of a sudden decide or discover that there is such a thing as headache, backache, or stomach-ache to be com-

plained about. One invariably finds an empirical basis of the pattern. The experience is provided either by examples furnished by other people or by illness in the patient's own past. Not less than 53 per cent of the hypochondriac children seen at the Harriet Lane Home had fathers or mothers who themselves were chronic complainers. In many of the homes, the patients had before them all the time the presence of relatives afflicted with protracted illness and disability. D. M. Levy, in a study of body interest and hypochondriac reactions in children,[2] placed "exposure to disease, deformity, accidents, death in others" and "disease coloring of the social milieu" first among the sources of experiences adapted to the development of invalid conditions. Richards also emphasized the significance of family health and attitudes toward health as outstanding factors in the formation of children's body concerns. Only an exceptional child would be capable of escaping participation in the sort of family life as that prevailing in the home of H. K., where father, mother, and several siblings knew of no other topic of conversation than the state of their respective stomachs, bowels, hearts, and other organs; where complaints were translated into homemade diagnoses and dire predictions; where the members of the group encouraged each other in the continuation of their invalidism; where papa carefully turned backaching mama around in bed, mama stroked and massaged daughter's aching temples, daughter administered suppositories and enemas to constipated brother, while brother served as errand boy to the drug store from which came supplies for papa, mama, and the entire family.

P. D. came to us with the following complaint: "Sometimes I have a pain in my right knee, and today in the street car I was putting my hand on the bench and it shakes all over. And then I have got pain in my feet, right in the arch. And then I have pains in my head. Sometimes in my stomach I have pain right around here. Then I have pain in my elbow, right here, when I shoot marbles. My eyes, right under here, hurt, only when I lie down. When I lie down it will be there an hour. Then I have pains under here (axilla) when I write in school. I get a pain where this bone is behind the ear; I get it sometimes when I bend over my head. Pains in my wrist right there; as soon as I fix something up, it will hurt. Right under my knee in my left leg—pains like needles, they go through here and come up here. That's the way it feels like. I guess that's about all." Where, you wonder, did ten-year-old P. get this whole assortment of complaints? P. supplied the answer: "My father had all the pains that I have." As a matter of fact, Mr. D. not only had all those pains but he lived on special diets because he considered himself endowed with what he and the family diagnosed as a "peculiar stomach." Mrs. D. was also very careful about her health and cherished the memory of a condition which had freed her from the hated school and kept her sheltered and inactive at home

for fourteen years until her marriage. The condition had been called St. Vitus' dance, which was miraculously cured at the time of her wedding when there no longer was a need for going to work or preparing herself for a vocation. Even though the St. Vitus' dance was over, the mother still considered herself sickly and subject to all sorts of things. The household regime was pervaded with the spirit of fear of sickness and close self-observation, reinforced by weird dietary notions and practices. P. was sent away from home for nearly five months and lost his complaint habit completely. He is now a healthy, normal, fifteen-year-old lad who, with the new insight gained at the clinic, has been able to help his parents to get over some of their hypochondriac peculiarities.

There are quite a few instances of children's hypochondriasis which does not start out as children's hypochondriasis but begins with parents' hypochondriasis concerning the children. In some cases, one even may go so far as to say that the child is *the parent's hypochondriac organ.* Before the child has reached an age when he is at all capable of distinguishing whether he is healthy or sick, his parents have fully established for him the atmosphere and reputation of being a delicate child, to be treated and reared differently from other children. When the child begins to orient himself, he enters his first interpersonal relationships as a "patient," as one about whom there exist worry, solicitude, special considerations, and privileges. His entire life experience does not contain a picture of himself as being well, as knowing himself to be well. He accepts his sickness as he accepts the assertion that he is a boy and not a girl. Thus one child, until her sixth year of age, accepted her mother's assertion that she, the child, J., was constipated and could have no bowel movements without drugs and enemas. Her mother had been a constipated invalid until the arrival of J. She is still a complainer, feels that she should eat "plenty of liver" because she "may be a little anemic," and her fallen arches have become the dreaded nemesis of all the local orthopedists. She had for many years been fully absorbed by the interest in her bowel movements. When J. was born, her own constipation disappeared and she transferred all her attention to the child's bowels. She stated at the clinic: "Ever since she was born she can't move her bowels properly. I always try to blame myself; maybe I didn't cook right, maybe I didn't give right, maybe I overcooked, maybe I undercooked. I think it might have started with nursing, my nipples are not properly built. My one nipple is not properly developed. The doctor told me that I could nurse the baby, and I did nurse, but maybe I should not have nursed her." The child was reared on special diets, suppositories, enemas, and had milk of magnesia, mineral oil, ex-lax, petrolagar, cascara, castoria, castor oil, and senna leaves stuffed into her. J.'s bowels had become her mother's organ of hypochondriac agitation. When J. was given an opportunity to estab-

lish her own routine of fecal elimination without artificial help, for the first time in her life, she discovered within less than a week that she was not really constipated. She has remained well ever since then.

Given a spoiled or insecure child and an atmosphere of body overconcern in the home, it often takes an episode of actual somatic illness to start off the sentiments and events that pave the way for the development of the invalid reaction. The nature and severity of the sickness do not matter much; it is the degree of alarm of the child and his family over his condition that matters most. Explosive manifestations of worry and affection, constant ministrations, submissive compliance with all of the patient's wishes, attractive bribes given for cooperation, all these things open the child's eyes to golden opportunities never dreamed of before. He learns that sickness has given him power and suspended for him all responsibilities of domestic routine and school attendance. If in the future there is a desire to get away from unpleasant tasks, criticism and punishment, another child's rivalry, a dreaded test at school, or insecurity concerning parental attention and affection, the body serves as a tool which conveniently solves the child's problems in a manner which, during his previous illness, he had found so profitable. We do not wish to infer that this "flight into disease" has been a coldly calculated affair. The child has not reasoned all this out for himself. When he complains of headache on Monday morning, he does not say to himself: "I want to stay away from school. Complaining of headaches will cause mother to make me stay in bed. Therefore, I'll tell her that I have a headache." The child usually does experience the painful sensations about which he complains. His hypochondriac nausea may lead to vomiting as any other nausea may. Often his complaints are based on events which can be explained physiologically, that is, as casual or habitual intensifications of normal, natural, visceral participations in emotional reactions. We know how drastically these may be intensified, especially in children. We know how the respiratory concomitants of fright and anger may work themselves in infants into a pitch of breathholding spells. We know how the slight nausea that goes with disgust may, in children, start off an attack of vomiting. The patient certainly does not hold his breath nor vomit deliberately. Similarly, he does not deliberately slide into hypochondriac invalidism. He does not, with full knowledge and out of sheer deviltry, use his organs as tools for domination or as culprits excusing his unwillingness to go to school on the days of arithmetic tests. The complaining child really believes himself physically sick, more so if his complaints are interpreted as physical sickness by his family and by his physician.

With this, we come to a further potent factor in the development and spread of the invalid reaction. It has been designated as the iatrogenic, or physician-determined, factor. We have seen how the invalidism of

G. R. and the concern of his family were fostered by alarming diagnoses, such as pleural pneumonia, kidney trouble, acute rheumatic fever, coma, and lethargic encephalitis. We have seen quite a few children and their families who had been frightened out of their wits by such pseudo-diagnostic scares. We remember one girl whose anxiety attacks were adorned with the appellations of leaking heart and suprarenal tumor. We remember another girl, ten years of age, who for the same reason had been drugged with digitalis and kept out of school for not less than two years. When she was first brought to our clinic in February, 1932, she had been dragged out of bed where she spent three full months by order of a physician who had even forbidden her to turn over in bed without assistance. The child was found to be healthy physically. There was no trace of any cardiac abnormality. The child and her parents were confronted with the facts; so was her family physician. There was good cooperation, and within a short time the girl had no more anxiety attacks, went to school regularly, enjoyed playing outdoors, and got along well in every respect.

Physicians, of course, are and should be viewed by the laity as men of authority in medical matters. Their statements are regarded as incontestable truths. Their diagnoses are final judgments. Diagnostic errors and uncertainties are excused by the reasonable layman, who does not expect superhuman infallibility. But diagnostic scares, ambiguities, and swear words sin against the age-old medical principle of *Nil nocere*. The breeding of invalid reactions is one of the damages that may arise from them. The case of G. R. has shown what diagnostic scares can do. The ambiguities are sometimes disguised as guardedly uttered possibilities, given out to the parents in the patient's presence. There was the boy whose general restlessness and occasional mild ties caused his physician to remark that "it may possibly be the beginning of St. Vitus' dance." The words "may," "possibly," and "beginning" were instantly forgotten by the audience. The one thing that loomed conspicuously in their minds was the term "St. Vitus' dance." The child, who was not choreic, was kept at home and away from school, from play, from health. Put on a diet which was to be especially strengthening, treated to sedatives, forced to take afternoon naps, he soon became invalidized by otherwise sensible parents of an otherwise not hypochondriac child. The removal of the St. Vitus sticker from the boy and attention to the factors that had produced the ties and restlessness restored the child to normality within a short time. Another form of diagnostic ambiguity is due to the light-hearted use of popular slang, more specifically the adoption of "touches." The *Winston Dictionary* defines this sort of touch as "a light attack, as of a disease." But often this meaning is not adhered to. A "touch" of bronchitis has come to mean: "Well, perhaps not exactly bronchitis,

but something or another of that sort." What should a mother do with "a touch of pneumonia," "a touch of rheumatism," or "a touch of St. Vitus' dance"? She hears pneumonia, rheumatism, or St. Vitus' dance and is frightened. "Verges" have a similar effect. We had a number of children brought to us who had been diagnosed as being "on the verge" of "a breakdown," "complete prostration" or again "St. Vitus' dance." These "touches" and "verges" often play havoc with the whole living conditions, daily routine, educational program, and outlook on life of a human being.

The diagnostic swear words are borrowed from the psychiatric vocabulary. The most frequent offenders are the words, "nervous," "neurotic," "psychoneurotic," "neuropathic" and "psychopathic." "Inferiority complexes" and "mother fixations" run a close second. All these words have meanings, some of them not clearly defined and open to controversy. They may or may not have a meaning to the physician who tosses them to his patient's parents. But they often do have a specific meaning to an oversolicitous, anxious mother. To her, neurosis, or inferiority complex, is the name of a disease which has the child, in the same sense that scarlet fever or pyelitis has the child. To her, these terms are sufficient reason to start or continue a campaign of overprotection and overindulgence, opening all doors to the invalidization of the patient.

The invalid reaction is a *reaction to something*. The spoiled, insecure, or immature child, learning from adult examples and his own previous illness, with or without the help of iatrogenic admixtures, uses his complaint more or less knowingly for a purpose. His hypochondriasis is a bid for something, an escape from something, a protest against something. Hence the mere recognition of the invalidism as being of psychogenic rather than organogenic origin is obviously not sufficient in itself. There is also *a situation* that calls for recognition. This situation may be lack of parental affection which the child thus tries to force through his illness; it may be an intolerable school situation due to grade misplacement or parental overambition and perfectionism; it may be fear of the pranks of a neighborhood bully. It was, in one instance, the dread of the return of a brutal, alcoholic father who had been ordered by the court to stay away from the home. The man had threatened that some day he would come back and "get even" with his wife. D., their only child, reared in an atmosphere of unhappiness and insecurity, spoiled by his mother who felt that he was the only thing she had to live for in this world, feared for his mother's safety. He developed a variety of complaints which kept him away from school and served to give him the satisfaction that in the case of his father's return he would always be at home to protect his mother. We have had the opportunity to observe the contrast between the patient's own awareness of the

etiologic situation during the hypochondriac illness and after recovery. As long as the child displayed his invalid manifestation, he rarely, if ever, realized the connection between his complaints and the responsible situation. When seen two or three years after the cessation of his invalid behavior, the child, sometimes amused, sometimes apologetic, usually gave a surprisingly clear account of the events to which he had reacted with somatic preoccupations.

A knowledge of these factors is indispensable for the prevention and treatment of the invalid reaction in children. The prophylaxis consists largely in the cultivation in the home of a healthy attitude toward health and a healthy attitude toward sickness. This point has been stressed recently by Lucas,[3] who rightly deplored misleading labels and the fallacies of standardization. Dr. Brennemann has always deplored them; his widely discussed outcry against the menace *of* psychiatry was in reality an outcry against the menaces *to* good psychiatry, for good psychiatry and good pediatrics avoid enslavement by rigid norms of weight charts, basal metabolic rates, and intelligence quotients. They recognize early difficulties and danger signals and deal with them calmly and efficiently, without using them as excuses for scares, agitations, and therapeutic polypragmatism.

For this reason, the prevention of invalidism begins at the beginning. It starts by dispelling superstitious or otherwise faulty notions about prenatal influences and bugaboos of heredity. Much would have been accomplished if some one had set G. R.'s mother straight on her ideas about the supposedly dire future of her "change-of-life baby." After childbirth, anxious and overanxious parents should be desensitized with regard to the significance of too narrowly delimited standards and norms. No one has a better chance to guide the parents safely and wisely in matters of children's nutrition, elimination, and general habit training than the pediatrician, who is their natural adviser throughout their offspring's years of childhood. Many instances of disturbing feeding difficulties with or without vomiting, many cases of bowel overconcern could have been prevented by judicious handling at the time of their onset, which often enough is the period of early infancy. Many practices of pampering, coddling, overprotection, oversolicitude, and artificial retardation of the development of self-dependence could have been nipped in the bud or reduced to tolerable proportions. If a physician has succeeded in creating and fostering in the family a healthy attitude toward health during the first year or two years of a child's life, he has contributed a lion's share to the prevention of hypochondriac reactions. The psychiatrist does not get to see the patient until after the complaint habit has existed for quite some time; the pediatrician sees him very much earlier, in many instances before any such trends have made their first appearance. *The prevention of chil-*

dren's invalidism is therefore primarily the domain of the pediatrician and must be accepted by him as a definite challenge and responsibility.

A further and equally important prophylactic feature consists in the introduction and maintenance of a healthy attitude toward sickness. Physicians must realize that their office and bedside manners have the power of creating or averting, strengthening or lessening the tendency to hypochondriac conditions. Ejaculation of diagnostic terms, discussion of differential diagnosis, pronouncements about the severity of the disease, prognostic judgments, and recitals of all possible complications sometimes take place in the child's presence, as if he were inanimate and not in the least concerned about what is being said of him. Many sins of this kind are committed daily on hospital ward rounds. The child, unable to grasp all that is being said, ponders about the things he has heard and usually carries with him a disturbing, distorted idea of his illness. If he is so constituted and family solicitude supports him, these things suffice to start him on the road to somatic preoccupations and eventual invalidism. Such matters are best taken up with the parents in the child's absence, with avoidance of medical slang and unnecessary alarm. This, however, does not mean that the patient himself should be left in total ignorance of what is ailing him. We know of children suffering from cardiac ailments who, without ever being told why, have been kept in bed for weeks, given medicines, looked on with worry and commiseration, and pampered by their families who could not understand why the children refused to remain quietly in bed and take their drops and pills. A few calm, explaining words addressed by the physician directly to the patient often solve such problems and have the advantage of avoiding morbid brooding and introspection, through knowledge of the real issue.

The treatment of the invalid reaction in children must be preceded by an understanding of that which is to be treated, that is, the child, the family attitudes, and the responsible situation. Knowledge of the child should always include a careful physical examination. Not only have we seen hypochondriacally invalid children, whose innocuous hearts, appendices, blood pressures, and hemoglobin percentages had been blamed for their complaints, but also patients whose difficulties had been too hastily interpreted as being of a hypochondriac nature because their organic basis had been overlooked. Once a spoiled, attention-getting, little girl, after almost two years of complaining, was referred to our clinic for psychiatric treatment of what was described as "mental pain" in her left arm; the finding of slight weakness and atrophy of the arm suggested x-ray examination which, in addition to subsequent surgical exploration, led to the discovery of a tumor of the coracoid process. In another instance, the psychiatrist arranged for the removal of the appendix of a boy referred with the diagnosis of invalid reaction because of the child's persistent complaint of abdominal pain; the clin-

ical symptoms, the leucocyte count and the surgeon's findings fully justified the operative procedure. The diagnostic error, in this case, was due to the fact that the child had been known for a long time as a hypochondriac complainer. It had therefore been taken for granted that the abdominal pain had the same origin. This example shows how important it is to remember that a hypochondriac child may also become physically ill, just as any other human being, and that for this reason every complaint calls for a physical examination before its real source is ascertained. One must know further that the invalid reaction sometimes manifests itself as an exaggeration of real organic illness which needs no less attention than its hypochondriac exaggeration. Therapy, in such cases, is a combination of physical treatment and the establishment of a healthier attitude toward sickness.

Once the diagnosis of invalidism has been arrived at satisfactorily, the manner in which it is formulated to the child and his parents is of paramount therapeutic importance. The mere assertion that "there is nothing wrong" is likely to be met with impatient incredulity. In fact, such an assertion is an untruth. For though there may not be anything wrong with the organs of the body, there is most assuredly something wrong with a child who, having healthy organs, nevertheless experiences discomfort and is incapacitated and seriously maladjusted. The contribution of psychiatry to general medicine and pediatrics consists largely in its emphasis on the pathology of the person over and above the pathology of organs. The organs of a hypochondriacally invalid child may be in good condition, but the individual, the patient, is not well and needs treatment. If the parents are told that there is nothing wrong they are entitled to the question, which they invariably ask, "Well, why then does he complain so much? It does not seem to us that he is just simply deceiving us all the time. There must be *something* wrong."

The best thing to do is to explain to the parents separately and the child separately that a thorough physical examination, giving due consideration to every complaint, has shown that his body is healthy; or that a carious tooth or enlarged tonsils have been found to be the only things that need correction, as far as the child's organs are concerned. The point should not be argued. The statement should be supported authoritatively by the physician's better knowledge of such things. Right then, the parents should, without being criticized or berated, be given an understanding of the factors which have led to the development of the invalid reaction. Professional lingo should by all means be avoided. The principal postulate for successful treatment is the conviction of the child and his family that the complaints are not based on organ pathology but on the psychobiologic factors found to be at work.

These factors must then be dealt with. Parental overindulgence and oversolicitude must be discouraged and substituted by more appropriate

methods of habit training and emancipation. Sometimes it is advisable to have a hypochondriac parent, or other member of the household who has furnished the pattern, examined with the aim of doing away with any example that can be, and has been, copied by the patient. The situation to which the child has reacted with invalid behavior should be made more tolerable for him. If he is found to be misplaced at school, a more suitable grade adjustment should be recommended. Adequate recreational outlets and opportunity for play with coeval children should be provided. Sources of specific disappointments or other unpleasantness and unhappiness should be remedied as far as possible. At the same time, the domestic sickroom atmosphere should be thoroughly driven out of the house. The various medicines with which the child has been drugged should be thrown out. The interrupted school attendance and other routine and play activities should be resumed on a given day. The physician will best pay a visit to the home on the morning of that day and convince himself that his recommendations have been carried out. If they have not, he has an opportunity to reemphasize them. Occasionally several such visits are required. In those few cases in which a parent cannot give up so easily her lifelong habit of using the child as her hypochondriac organ, it may become necessary to remove the patient from the home for some time, during which he or she could gain distance from the old practices and at the same time receive continued assistance in the required change of attitude.

The next step consists in regular follow-up work with the child, who is to learn through judicious guidance and home management that the hypochondriac pains are unhealthy, undesirable, and unprofitable expressions of improper adaptations, to be replaced constructively through social and recreational outlets and utilization of his interests, ambitions, and assets. The results, in most cases, are surprisingly favorable. Dr. Richards' experience has been the same as ours. She says, "In reviewing the data of the follow-up notes, one is struck by the rapid subsidence of somatic incapacitations after the adoption of the new therapeutic regime."

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THE DIAGNOSIS OF NONOPAQUE FOREIGN BODY IN THE TRACHEOBRONCHIAL TREE, WITH A DESCRIPTION OF THE PHYSICAL AND X-RAY FINDINGS

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THE diagnosis of nonopaque foreign body in the lung in most cases may be readily established. Occasionally, because of inadequate history and physical examination, or misinterpretation of one or both of these, an incorrect diagnosis is made. A lack of familiarity with the findings to be expected in such cases is frequently encountered. This is due in part to the relative infrequency with which such cases are seen, but it probably also is due in a measure to the fact that this subject is rarely referred to in the current medical literature.

Iglauer[1] in 1911 probably was the first to publish his observations on the x-ray diagnosis of nonopaque foreign body in the lung. Shortly after, Jackson, Manges, and McCrae published numerous articles on the subject, and Jackson's book, *Bronchoscopy, Gastroscopy, and Esophagoscopy*,[2] deals fully with the subject from the standpoint of history, physical examination, and x-ray examination.

The general picture presented by a patient with nonopaque foreign body in the tracheobronchial tree in many respects resembles closely that seen in individuals suffering with any one of the common disorders of the pulmonary tract seen in everyday practice. There are certain variations, however, which usually are present and which are noteworthy and diagnostic. The first of these has to do with the mode of onset. In the case of disorder caused by a foreign body the history of onset is sudden and violent and occurs in an individual previously well, while in the ordinary pulmonary disorders, the history of onset is more gradual and of a milder nature and follows as a rule affections of a similar nature in the upper respiratory tract.

There are also signs and symptoms which are characteristic of foreign body and which pursue an entirely different course than those seen in the usual pulmonary disorders. Many of these signs and symptoms are not present in the ordinary type of pulmonary disorder, as is shown by careful consideration of the history and examination findings. Such, for example, is the suddenness and severity of the onset of the disorder in an individual previously well, the "symptomless interval"

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followed by a recurrence of symptoms, and the special physical signs which are found only in the presence of partial obstruction of the tracheobronchial lumen.

Since confusion and doubt as to the diagnosis so often is experienced in the conduct of such cases, it was thought worth while to present a detailed description of the method we have found most satisfactory for their study in an effort to arrive at a correct diagnosis.

As compared with other pulmonary disorders, that due to the aspiration of nonopaque foreign body is somewhat rare, but actually it is an accident of rather frequent occurrence. This is not surprising when we recall the proclivity of children to place in the mouth all manner of things, then to stumble and fall, and with the full aspiration accompanying such sudden exertion, to find that the object has gone down the throat. Any object loose in the mouth under such conditions and small enough to pass through the larynx may be aspirated. Most often it is some article of diet, especially peanut candy, seeds, grains of corn, beans, as well as such objects as pebbles, beads, tacks, and pins. Such objects may be single or multiple; for instance, I have had one child with three grains of corn in the trachea.

The general practitioner usually is the first to see such patients. Because of certain peculiarities to be mentioned later, it behooves him to be on his guard when taking the history in the case of children or others with unexplained pulmonary disorders. As Jackson pointed out years ago, one should keep in mind the possible presence of a foreign body when searching for the cause of a shadow in line with a bronchus, and in unexplained bronchial obstruction, partial or total, with bronchiectasis or lung abscess. The same holds true when searching for the cause of acute pulmonary disorders after dental extractions or surgical operations about the nose and throat. It is characteristic in cases of foreign body in the lung to find that the disorder was of sudden onset in a patient previously well. This is an important feature. The symptoms mentioned as a rule are cough, cyanosis, dyspnea, and sometimes momentary unconsciousness—all of which occurred while the patient was pursuing his normal course. The cough in such cases is sudden, paroxysmal and severe and is accompanied by dyspnea and sometimes stridor, with cyanosis of a more or less marked degree, depending upon the amount of obstruction and the spasmodic response to irritation. Temporary unconsciousness may occur. Not infrequently it is found when the patient arrives at the physician's office his condition has improved so that he has little or no cough, cyanosis, stridor, or dyspnea, being practically free of symptoms at the moment. This was described by Jackson as the "symptomless interval,"[3] and if not recognized, the attending physician very likely will not think it necessary to make a physical examination of the chest.

Therefore, in the presence of a positive history, whether the symptoms be positive or negative, it is imperative that the patient be stripped to the waist and a careful physical and x-ray examination of the chest made. It will also be found that many such patients have fever, leucocytosis, and an increased respiratory rate. The writer has seen a patient who within four hours after aspiration of a piece of peanut had atelectasis of the right lower lobe, leucocytosis of 20,000, a temperature above 104° F., a respiratory rate of forty-eight, and a general condition closely resembling that of a profound pneumonia.

It has been found repeatedly that after the "symptomless interval" there is a gradual recurrence of the cough, the dyspnea, and the cyanosis, especially upon exertion. Older children frequently show little or no sign of serious disorder, but young children on the other hand often appear to be, and are, seriously ill.

A foreign body may be impacted or movable. When not impacted, it is shifted about from one position to another by the cough. It may be thrown by the bechic impulse upward where it strikes the lower surface of the vocal cords. When the mouth is open, the impact may be heard. This is known as the audible slap.[4] The same impulse may be discerned by the palpating fingers placed against the walls of the larynx. It is then known as the palpatory thud.[5] A foreign body in the tracheobronchial lumen, by partially blocking the air current, causes a wheezing breath sound which is more marked on exhalation. This is best heard by placing the ear or the stethoscope before the open mouth. This sign is known as the asthmatoid wheeze.[6] These signs when positive are pathognomonic of a foreign body in the tracheobronchial tree.

An additional special sign which I have observed repeatedly is the "split cough." It has the characteristics in general of the asthmatoid wheeze and is typical of partial obstruction by a foreign body.

It is important to remember that nonopaque foreign body in the tracheobronchial lumen may be impacted or movable and that, when it is unimpacted, the area of involvement as shown by physical and x-ray findings changes with shift of position of the foreign body. Moist râles are usually found throughout both lungs in all cases. If this factor (impaction) is forgotten, confusion and error are almost certain to follow. The urgency for early and correct diagnosis is better realized when we recall that many nonopaque foreign bodies after exposure to warmth and moisture rapidly increase in size. Such a foreign body when impacted in a bronchus is at once dangerous to life, but this danger is increased when, and if, by swelling of the foreign body and of the mucosa and by coughing the foreign body be extruded into the trachea. When this occurs, we may hope to save the life of such a patient only by immediate bronchoscopic treatment under the most ideal conditions.

In addition to this danger, when obstruction is allowed to continue indefinitely, a serious train of developments in the lung distal to the

obstruction may be expected. These are in order "drowned lung," pneumonia or pneumonitis, abscess, bronchiectasis, and occasionally empyema or pyopneumothorax.

In addition to the diagnosis, its localization before attempting removal of a foreign body is important. We find it helpful to follow a definite plan of study in such cases. This plan is as follows:

1. Careful attention to the history
2. Physical examination of the chest
3. Fluoroscopic examination of the chest
4. Study of x-ray films made at the end of full inhalation and at the end of full exhalation
5. Bronchoscopic examination when in doubt.

The History.—It is imperative that the physician take the history personally, because of the importance attached to details which may seem minor to the uninitiated. Such details are the previous state of health, the present condition and its duration, the mode of onset whether gradual or sudden, an accurate description of the accident and the foreign body, and a careful study of an identical specimen if possible. A positive history of choking, cyanosis, dyspnea, or wheezing, associated with the occurrence of any one of the special signs, i.e., the "asthmatoid wheeze," the "audible slap," the "palpatory thud," or the "split cough," are almost positive evidence of the presence of a foreign body in the tracheobronchial tree; and it is the duty of the physician to recommend bronchoscopic removal. Occasionally, we have only a history of choking and cyanosis without any of the special signs. We have also had cases in which there was no positive history of any accident but, because of the mode of onset and the type of physical signs, bronchial obstruction by a foreign body was the only plausible diagnosis.

Physical Examination.—In patients suspected of having aspirated a foreign body, it is wise to disturb them as little as possible because of the danger of dislodging a foreign body from a bronchus into the trachea with resultant tracheal obstruction. Occasionally, it is also true that a foreign body may be dislodged from the pharynx or supraglottic space into the trachea and later into a bronchus. The writer is acquainted with one case in the practice of another physician in which a straight pin was dislodged from the hypopharynx into the trachea and finally into an upper lobe bronchus, during the course of an indirect examination by a house officer. Also it is important to remember that these patients at times are gravely ill and do not tolerate manipulation, as would a child not particularly ill. Therefore, local examination of the mouth and pharynx, at least until the patient is in the operating room where bronchoscopy may be immediately carried out, should be discouraged.

In physical examination of the chest we may expect to find after aspiration of a foreign body any one of the following conditions, namely:

(1) obstructive emphysema unilateral (Cases 1 and 2), (2) obstructive emphysema bilateral (Cases 3 and 4), (3) shifting obstructive emphysema (Case 5), (4) atelectasis (Case 6), (5) A combination of obstructive emphysema and atelectasis unilateral (Case 7).

The occurrence of obstructive emphysema results from the variations in the diameter of the tracheobronchial lumen during the respiratory cycle. During inhalation the diameter and length of the lumen are increased, while during exhalation these are both decreased. Therefore, air may pass between the foreign body and the bronchial wall with greater freedom during inhalation than during exhalation with the result that distention of the lung occurs distal to the site of lodgment. The air does not, however, pass into the lung in normal volume, hence the changes noted on physical examination to be described below.

When a foreign body totally obstructs the lumen so that no air may pass the site of lodgment, that air already present in the lung distal to this point is quickly absorbed with resultant atelectasis. These changes occur in an incredibly short time as has been demonstrated by us time and again both experimentally and clinically.

PHYSICAL EXAMINATION

Inspection.—The patient should be stripped to the waist and examined in a good light. Comparison of the movements of the chest wall on the two sides should be made and evidence of cyanosis and indrawing of the suprasternal, supraclavicular, intercostal, and epigastric spaces should be looked for. Restlessness or uneasiness on the part of the patient should be noted at this time; also the presence or absence of special signs, such as the asthmatoid wheeze, the audible slap, the split-cough, and the palpatory thud should be noted. The location of the cardiac impulse may also be detected.

Auscultation.—With the stethoscope in front of the open mouth and at the end of a deep breath, the asthmatoid wheeze may be heard when otherwise undetected. The audible slap also may be detected in this manner. Changes in the breath sounds will depend upon the degree of obstruction and its location. It is often possible by auscultation alone to localize the point of obstruction or to discover that a foreign body is unimpacted by reason of the change in position of the obstruction.

Over an area of obstructive emphysema breath sounds are suppressed or "distant" because the volume of air entering the lung field distal to the obstruction is less than normal. The breath sounds over the unobstructed lung field may be greater than normal, especially upon exertion (compensatory). In the presence of unimpacted foreign body, the area over which changes in breath sounds will be noted will be altered with the shift of position of the foreign body. If the foreign body is in the trachea, there will be a suppression of breath sounds over both lungs

and râles throughout the entire lung field because of the free outpouring of mucus and pus. In atelectasis the breath sounds are absent and vocal fremitus is decreased or absent.

Percussion.—Because of the increased air content the percussion note over an area of obstructive emphysema shows hyperresonance with a low note. The area of obstructive emphysema may be actually marked out by auscultation and percussion. Over an area of atelectasis the percussion note is dull or flat and has a high pitched note.

Palpation.—Vocal fremitus over an area of obstructive emphysema is somewhat decreased, and over an area of atelectasis it is absent.

FLUOROSCOPIC EXAMINATION

After the physical examination of the chest, fluoroscopic examination should be carried out. By this means we are enabled to observe accurately for comparison the movements of the chest walls and the diaphragm on the two sides and any change in position of the heart during the respiratory cycle. These movements should be studied carefully during inhalation and exhalation.

EXAMINATION OF X-RAY FILMS

X-ray films should be made not only for permanent records but because of the fact that they usually reveal findings which cannot always be made out fluoroscopically and because we may study them repeatedly and at our leisure. Actual measurements should be made in such cases (Case 4, Figs. 9 and 10; and Case 5, Figs. 12 and 13). These films should be made in pairs on a fast machine, one at the end of full inhalation and one at the end of full exhalation. Cardiac shift depends upon inflation and deflation of the unobstructed lung, as well as do the movements of the diaphragm on the unobstructed side.

In obstructive emphysema the x-ray findings are as follows: In unilateral obstructive emphysema it will be noted that the diaphragm on the obstructed side is pushed down and remains in a more or less fixed position, while the diaphragm on the unobstructed side moves freely with respiration (Case 2, Figs. 5 and 6). The heart is shifted to the unobstructed side at the end of full exhalation and pushed back to its normal position during inhalation. The ribs on the unobstructed side occupy the horizontal position at the end of full inhalation and drop to the more vertical position at the end of full exhalation. There is also greater width in the intercostal spaces at the end of inhalation, i.e., full inflation of the lung. The ribs on the obstructed side remain in a more horizontal position with widened intercostal spaces.

In bilateral obstructive emphysema caused by partial tracheal obstruction, there is increased air content in both lungs throughout the respiratory cycle with increased intrapulmonary pressure on both sides.

This increase in pressure is demonstrated by the depression of the dome of the diaphragm on both sides, the elevated position of the ribs, and the change in the size and shape of the cardiac shadow as a result of compression of the heart and mediastinum from both sides.[7]

Evidence of pressure is greatest at the end of exhalation because of the muscular effort to force the air out of the lung. This is the result of voluntary muscular effort to empty the lungs. With this considerable increase in intrathoracic pressure it becomes at once evident that serious compression of the mediastinum and its contents, the return blood supply, and the cardiac blood supply is unavoidable.

In atelectasis the heart is shifted toward the area of collapsed lung and fixed in this position, the diaphragm on the obstructed side is elevated and fixed, and the ribs are in the vertical position (Case 6, Film 1). The cardiac shadow may be shifted beyond the vertebral border so that no portion of it is visible, and the trachea also is shifted from its usual position, which is somewhat to the right of the midline.

In the presence of combined atelectasis and obstructive emphysema the findings partake of both of these conditions (Case 7, Fig. 14). We may say, therefore, that in the case of atelectasis of the lower lobe and obstructive emphysema of the upper lobe, the diaphragm on the obstructed side will be elevated and the apex of the heart shifted toward the area of atelectasis, while the base of the heart will be shifted away from the area of obstructive emphysema, the upper ribs being in the horizontal and the lower ribs in the more vertical position.

X-ray diagnosis of unimpacted foreign body depends upon our ability to visualize fluoroscopically the changes as they occur and to secure films during the short interval in which the foreign body remains stationary (Case 5, Figs. 11 and 13). This is at times extremely difficult because of the more or less constant movement of the foreign body as the result of continuous coughing. It is in the movable or unimpacted foreign body that the diagnosis is attended with the greatest difficulty, and at times bronchoscopy is required in order to settle the question.

The x-ray studies in the cases herewith presented were carried out in the Mallinckrodt Institute of Radiology, jointly by Dr. H. M. Wilson and Dr. Sherwood Moore, the latter of whom has been kind enough to approve of the descriptions as included.

The diagnosis both as to presence of a foreign body and its localization was established in each case before the patient was sent to the operating room. The accuracy of the diagnosis in Case 3, which was made by Dr. Wilson, is especially noteworthy because there was no history of an accident involving a foreign body. The child, six months old, was confined to her crib and had no way of obtaining a foreign body except through one of the older children, who, as was discovered later, had without the mother's knowledge gone into the room and given the baby the twig, which she had promptly aspirated.

SUMMARY

Nonopaque foreign bodies are aspirated more frequently than generally is supposed. Their nature is of a wide variety; they may include any object which may be placed in the mouth and which is small enough to pass through the larynx. Such objects may be present without the knowledge of the patient or his family.

The consideration of the history is one of the most important steps in the study of these cases. Any positive history may not with safety be disregarded. It frequently is true that these patients are seen during what has been described as the symptomless interval. It is not unusual for the accident to occur concomitant with some other disorder, such as acute tonsillitis. The presence of such accompanying disorders must not be permitted to overshadow the importance of a positive history of foreign body. This need is emphasized by the fact that complications and sequelae of a most serious nature will occur if a foreign body is left in the tracheobronchial tree.

The special signs, which are the asthmatoid wheeze, the audible slap, the palpatory thud, the audible flutter, and the split cough, especially when associated with a history of sudden attack of choking, coughing, cyanosis, or dyspnea, are pathognomonic of the presence of foreign body in the tracheobronchial tree.

Careful physical and x-ray study of the chest and mindfulness of the changes occurring in the presence of such obstruction are imperative. It must be remembered that both lungs usually are involved, that of the unobstructed lung being the result of overflow of mucus and pus as well as the compensatory function.

When there is doubt as to the diagnoses in cases which give positive histories or in which any of the above findings are positive, even in the presence of a negative history bronchoscopy should be recommended.

The accompanying case reports set forth the various important factors concerned in establishing the diagnosis in the presence of nonopaque foreign body in the lung. Case 8, in addition to bringing out the importance of proper interpretation of the history, also serves to demonstrate the serious nature and possibilities of complications in neglected cases of foreign body in the lung.

CASE REPORTS

CASE 1.—G. C., white infant, aged twenty-seven months, was admitted to St. Louis Children's Hospital on Oct. 29, 1932, with a history of having "swallowed" a peanut one month previously.

At the time of the accident the patient had a severe attack of coughing, but no cyanosis or dyspnea. Since that time he has had spells of violent coughing and vomiting. There was also wheezing. The cough was paroxysmal in nature. One week after the accident patient had a "bronchoscopy" at which time "a part" of the peanut was removed, the remainder being "broken" into small pieces.

Chest examination on admission to Children's Hospital showed breath sounds diminished over the left lung, hyperresonant percussion note over the right lung, and marked rhonchi throughout both sides. The split cough and the asthmatoid wheeze were both present.

Inhalation and exhalation films were taken on Oct. 29, 1932. In the inhalation film (Fig. 1) there is an equal air content in the two sides with cardiac shadow in the midline. In the exhalation film (Fig. 2) there is seen greater air content in the right with cardiac dislocation to the left. The left diaphragm is nearly as high as

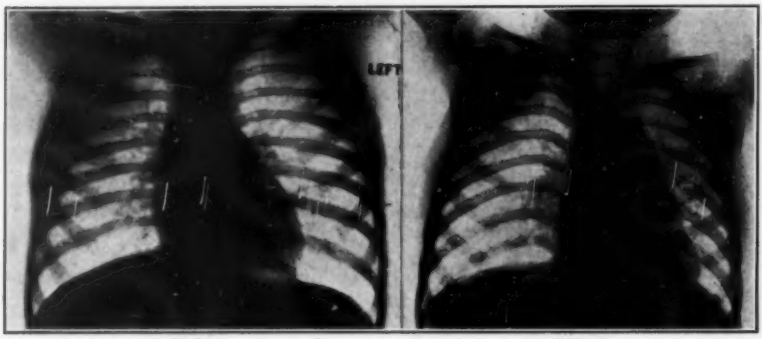

Fig. 1. Fig. 2.

Fig. 1.—Case 1. Oct. 29, 1932. Inhalation.
Fig. 2.—Case 1. Oct. 29, 1932. Exhalation.

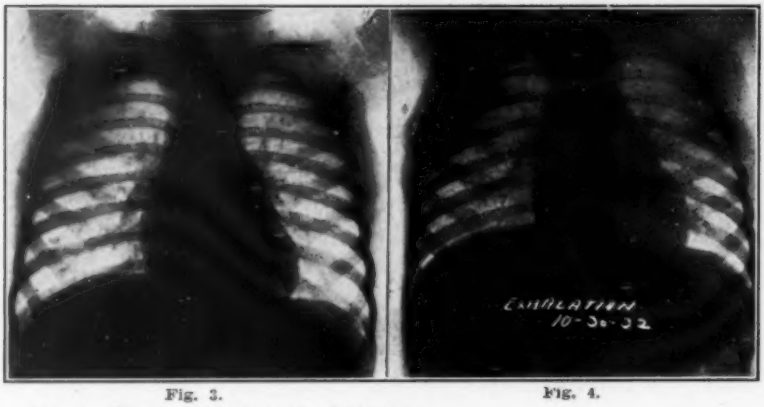

Fig. 3. Fig. 4.

Fig. 3.—Case 1. Oct. 30, 1932. Inhalation.
Fig. 4.—Case 1. Oct. 30, 1932. Exhalation.

the right diaphragm. The proximity of the heart shadow to that of the lateral wall of the chest is much greater than in the inhalation film. The diagnosis of obstructive emphysema of the right lung by a nonopaque foreign body in the right bronchus was made. This was confirmed by bronchoscopic removal of a half peanut.

Films made on Oct. 30, 1932, at the end of inhalation (Fig. 3) and at the end of exhalation (Fig. 4) for comparison show a normal picture of the heart, diaphragm, and lungs.

CASE 2.—D. M., white male, aged eighteen months, was admitted to St. Louis Children's Hospital on Oct. 19, 1932, with a history of having "swallowed" a peanut three weeks previously, with coughing, choking, and cyanosis following immediately. Since that time he has had a constant wheeze. He took nourishment poorly and had intermittent fever which had been much worse for the preceding two days.

Physical Examination.—The asthmatoid wheeze and a split cough were positive. Moderate cyanosis, slight indrawing of sternum and intercostal spaces, less movement of the right chest than the left, diminished breath sounds over the right lung, and hyperresonant percussion note were all present. Cyanosis became more marked during examination.

X-ray films made at the end of inhalation and at the end of exhalation show on inhalation (Fig. 5) increased air content throughout both lungs with marked depression of the diaphragm on both sides. At the end of exhalation (Fig. 6) the film shows cardiac displacement to the left, elevation of the left diaphragm, depression of the ribs on the left (vertical position) as compared with those on the right (horizontal position), and flattening out of the right dome of the diaphragm.

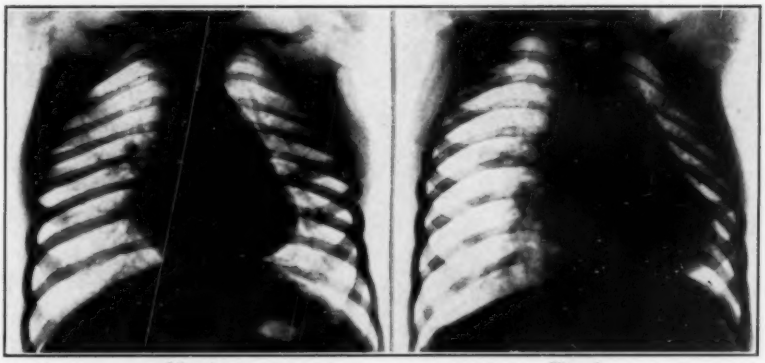

Fig. 5. Fig. 6.

Fig. 5.—Case 2. Oct. 19, 1932. Inhalation.
Fig. 6.—Case 2. Oct. 19, 1932. Exhalation.

By fluoroscopy the cardiac shift with each respiratory cycle was plainly visible.

At bronchoscopy a fairly large portion of peanut was removed from the right main bronchus.

CASE 3.—M. D., white female, aged six months, was admitted to St. Louis Children's Hospital on Sept. 21, 1933, with a history of having "been found yesterday morning in her cradle by her mother, apparently having a choking spell." She was gasping for air and was quite cyanotic. Only a few minutes before this, when the mother had seen the child, she was perfectly normal. Since the initial attack, she had been having choking spells about every fifteen minutes. There was no history indicating the presence of a foreign body.

Physical examination revealed the asthmatoid wheeze, cyanosis, and hyperresonance throughout both lungs.

X-ray films taken on Sept. 21, 1933, show increased air content on both inhalation and exhalation. In the exhalation film (Fig. 7) the heart shadow, as compared to that on inhalation (Fig. 8) is markedly narrowed from side to side. The dome of the diaphragm on both sides is pushed down, and the ribs are in a more horizontal position. Diagnosis of nonopaque foreign body in the trachea with cardiac com-

pression was made, and at bronchoscopy a small twig was removed from the trachea. It was then discovered that this twig had been given to the patient by another child.

Films made on Sept. 26, 1933, at the end of inhalation and at the end of exhalation showed normal cardiac shadow and normal chest otherwise.

In this case the history was negative, but the family physician sent the patient in with a diagnosis of foreign body in the airway because no other diagnosis was tenable.

CASE 4.—D. W., white male, aged three years, was admitted to St. Louis Children's Hospital on Feb. 13, 1933, with a history of having swallowed a "piece of raw corn" six days previously. A severe attack of coughing followed, and since then he had been wheezing. The local doctor did not believe that the child had aspirated the corn. The patient had been well except for the croup on several nights. At examination he had a constant hacking cough.

Chest examination revealed rapid respiration, no retraction, hyperresonance over both lungs, and hoarseness.

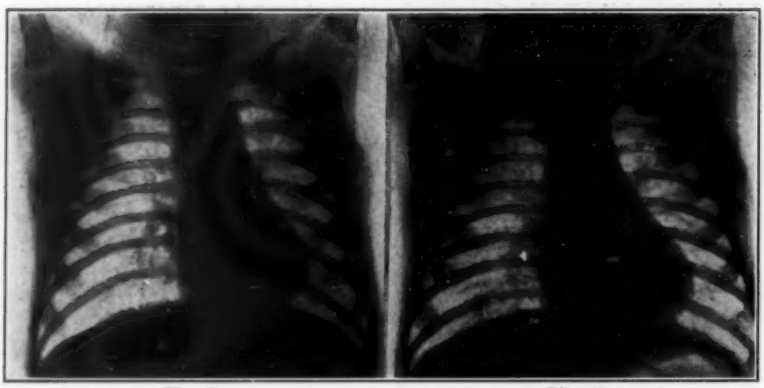

Fig. 7. Fig. 8.

Fig. 7.—Case 3. Sept. 21, 1933. Exhalation.
Fig. 8.—Case 3. Sept. 21, 1933. Inhalation.

X-ray films (Figs. 9 and 10) show cardiac compression from side to side with depression of the two leaves of the diaphragm and increased air content throughout both lung fields in both films. A diagnosis of nonopaque foreign body in the trachea was made.

With the laryngoscope a movable foreign body was seen in the trachea. The bronchoscope was then passed through the larynx and a grain of corn was removed from the trachea. There was marked reaction of the laryngeal and tracheal mucosa. The patient made an uneventful recovery.

CASE 5.—D. T., white male, aged two years, was admitted to St. Louis Children's Hospital on April 3, 1933, with a questionable history of having "swallowed" a peanut the day before. While eating peanuts, he had a sudden attack of coughing and became "blue in the face." He coughed some since then, especially when standing up. There was no retraction, no change in voice, and no cyanosis.

Chest Examination.—The physical findings in this case were difficult to interpret because they changed with nearly every breath. The patient was constantly coughing, and for this reason the physical signs changed. At one moment there would

be suppression of breath sounds over the right lung, and the next moment the breath sounds would be diminished over both lungs. An x-ray film was made after finding suppression of sounds over the right lung. Then a check up on the physical signs was made, and a suppression of sounds over both lungs was found. Immediately a second film was made. In Fig. 11, we see evidence of obstructive emphysema of the right main bronchus as compared with Fig. 12. In Fig. 13 we find narrowing of the heart shadow due to bilateral cardiac compression. A diagnosis of movable foreign body was made. In Fig. 11 it is located in the right bronchus, and in Fig. 13, in the trachea.

This diagnosis was confirmed at bronchoscopy by the removal of a piece of peanut which was shifting with every breath from the trachea to the bronchus, and then back into the trachea again.

CASE 6.—H. G., white male, aged fourteen months, was admitted to St. Louis Children's Hospital on Aug. 18, 1931, with a history of having aspirated a piece of peanut. He had been taken to his physician on this date three times, but upon casual examination his condition seemed satisfactory and he was sent away without a care-

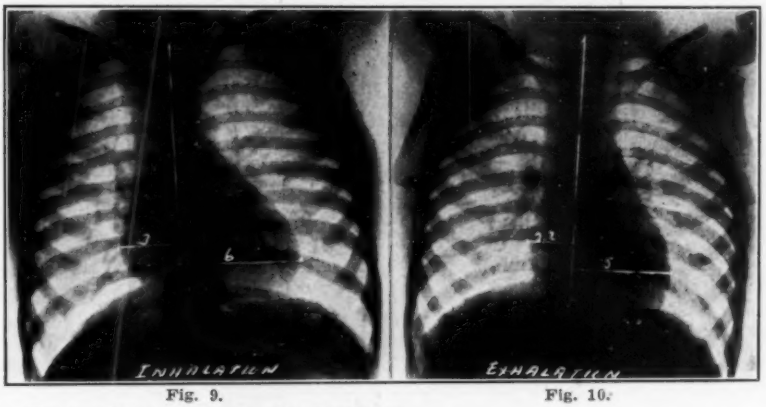

Fig. 9. Fig. 10.

Fig. 9.—Case 4. Feb. 13, 1933. Inhalation.
Fig. 10.—Case 4. Feb. 13, 1933. Exhalation.

ful physical examination. When he came to the St. Louis Children's Hospital, he had marked cyanosis and uneasiness, and upon physical examination he had absence of breath sounds throughout the right lung and a flat percussion note.

X-ray films showed that there was atelectasis of the right lung with cardiac shift so that the heart shadow was not visible and that the left lung had crossed over into the upper portion of the right chest. This is seen in the film taken thirty minutes before removal (Fig. 14).

In the film taken thirty minutes after removal of the foreign body from the right main bronchus (Fig. 15), the heart shadow is seen with aeration of both lungs. The film made on the following day confirms this finding (Fig. 16).

In this case is demonstrated the value of having apparatus for immediate use at all times. When the child arrived at the operating room, he was unconscious and not breathing. He was to all appearances dead. A sterile bronchoscope was immediately introduced, and a foreign body in the trachea was visualized. This was promptly grasped with the forceps and pushed into the right main bronchus, and the bronchoscope was kept in position since it was oxygen-bearing. Suction was applied to the secretions, which were abundant, and artificial respiration was given with the

Fig. 11. Fig. 12. Fig. 13.

Fig. 11.—Case 5. April 3, 1933. Exhalation.
Fig. 12.—Case 5. April 3, 1933. Inhalation.
Fig. 13.—Case 5. April 3, 1933. Exhalation.

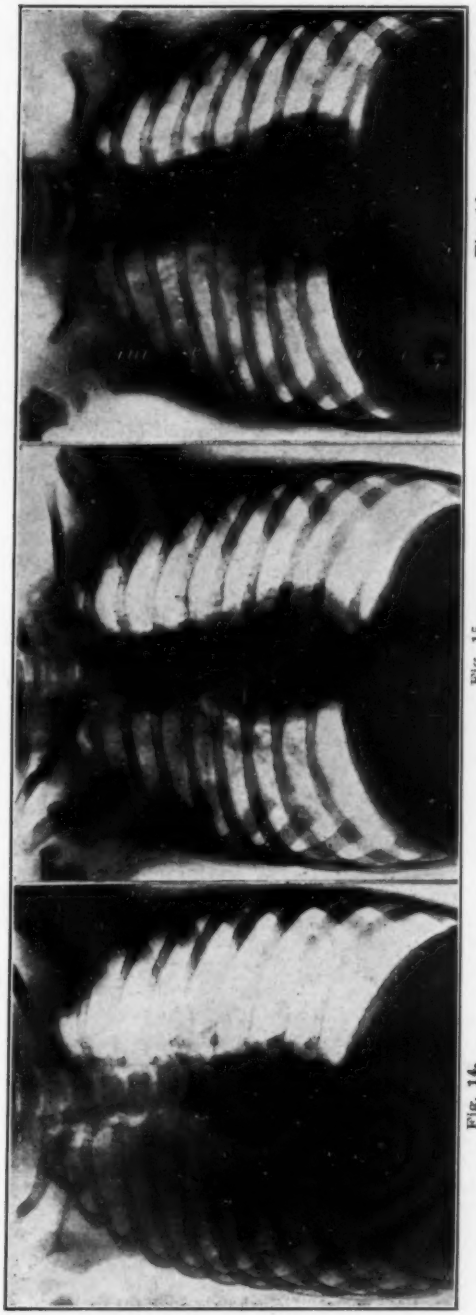

Fig. 14. Fig. 15. Fig. 16.

Fig. 14.—Case 6. Aug. 18, 1931. Thirty minutes before removal.
Fig. 15.—Case 6. Aug. 18, 1931. Thirty minutes after removal.
Fig. 16.—Case 6. Aug. 19, 1931. Twenty-four hours later.

Fig. 17. Fig. 18. Fig. 19.

Fig. 17.—Case 7. Nov. 2, 1932. Inhalation.
Fig. 18.—Case 7. Nov. 2, 1932. Exhalation.
Fig. 19.—Case 7. Nov. 7, 1932. Five days later. Inhalation.

result that normal respiration was soon resumed. After he was resuscitated, the foreign body was readily visualized and, after a firm grasp had been obtained, it was brought safely through the larynx with the bronchoscope.

CASE 7.—J. W., white female, aged fourteen months, admitted to St. Louis Children's Hospital on Nov. 2, 1932, with a history of having been found choking and blue while playing one week before, after she had been given some black walnuts

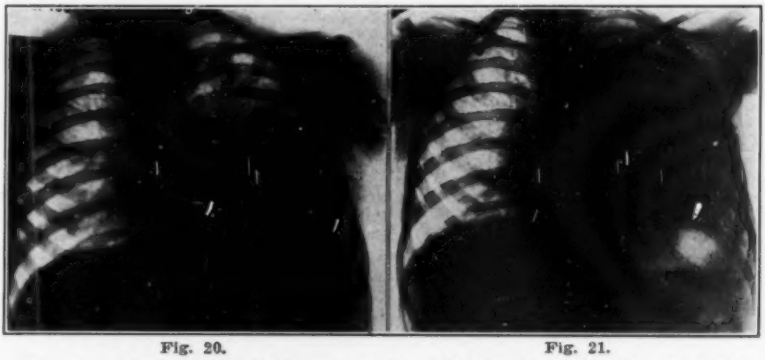

Fig. 20. Fig. 21.

Fig. 20.—Case 8. Film taken on Jan. 14, 1932, showing atelectasis of the left lower lobe with displacement upward of the diaphragm and to the left and with the cardiac shadow displaced to the left. This is accompanied by a considerable degree of inflammatory reaction of the upper lobe.

Fig. 21.—Case 8. Film taken on Feb. 3, 1932, showing an increase in area of involvement by the inflammatory reaction into the upper lobe and further displacement of the heart shadow and elevation of the diaphragm.

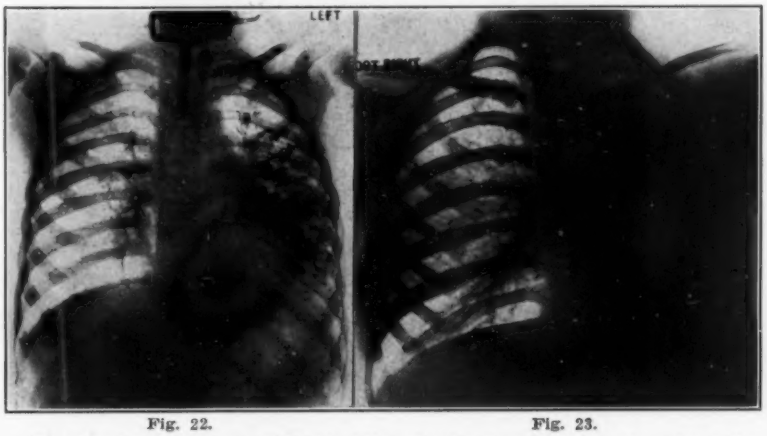

Fig. 22. Fig. 23.

Fig. 22.—Film taken on Feb. 24, 1932, showing bronchiectasis throughout the upper and lower lobe of the left lung.

Fig. 23.—Film taken on April 22, 1936, showing the appearance of the chest after removal of the entire left lung.

to eat. She had high fever, vomiting, and diarrhea. She appeared flushed, irritable, and acutely ill. Cyanosis was rather marked.

Chest examination showed diminished expansion of left lower chest with impaired percussion note over left lower chest posteriorly. Breath sounds were absent at extreme base posteriorly and diminished elsewhere over the left side. The percussion note was slightly hyperresonant anteriorly.

X-ray films made at the end of inhalation (Fig. 17) and at the end of exhalation (Fig. 18) showed atelectasis of the left lower lobe and obstructive emphysema of the left upper lobe. Fig. 19, taken after removal of the foreign body, shows normal position of the heart, diaphragm, etc. The diagnosis of nonopaque foreign body in the left bronchus with obstructive emphysema of the left upper lobe and pneumonitis or atelectasis of the left lower lobe was confirmed at bronchoscopy, when a portion of walnut was removed from the left main bronchus.

Fig. 24.—Case 8. Rochrograph of the specimen showing the lung injected with lipiodol after removal, demonstrating the bronchiectatic sacculations throughout the bronchial tree.

CASE 8.—J. W., white female, aged three years, was admitted to St. Louis Children's Hospital on Jan. 4, 1932. She had had a high fever and rapid respiration for two days. She was cyanotic and had a frequent rough cough. The father brought the child to the hospital and gave the history that the mother with several other children at home were ill with influenza and that this child had also had the "flu."

Inspection revealed a pale child with a respiratory grunt, rapid respiration, and diminished movement of the left chest. On examination, dullness was found over the left lower lobe, with markedly diminished breath sounds. Moist râles were found throughout both lungs. The patient was placed in an oxygen tent.

She was treated for pneumonia, probably with fluid in the chest until Feb. 8, 1932. By that time the mother had sufficiently recovered to come to the hospital to see the child, and on her first visit she thought it worth while to mention that this child had not been sick like the other children. Whereas the others had been taken ill gradually, the onset of this child's illness had been sudden, beginning with an attack of choking and cyanosis while eating peanut candy. Immediately thereafter she became seriously ill. The family physician made a diagnosis of pneumonia. The house officer on my service heard this story and told me about it. Bronchoscopy was recommended and carried out. A piece of peanut was found in the left main bronchus. There was more than the usual amount of pus in the tracheobronchial tree.

The child developed subglottic edema after the bronchoscopy and required tracheotomy. The drainage was persistent and profuse, but in due time we were able to remove the tracheotomy tube.

The inflammatory reaction in the chest did not clear up, and the child was periodically under hospital treatment and observation by the pediatric staff of the St. Louis Children's Hospital and the Chest Service of the Washington University Medical Center, from this time until 1936. During this interval she had bronchiectasis with numerous attacks of pneumonia. Because of involvement of the entire left lung and in order to relieve her of this focus of suppuration, it was decided to remove the whole lung. This was carried out by Dr. Evarts A. Graham, on Feb. 1, 1936. She made a satisfactory recovery and now partakes of the activities usual to a normal child. The x-ray films in this case are shown (Figs. 20 to 24).

This case is included because it demonstrates so well the importance of getting an accurate history in cases of pulmonary disorder of unknown origin, also the necessity for prompt removal of foreign bodies when present, if we are to avoid complications which follow in the wake of neglected foreign body in the tracheobronchial tree.

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THE COMPARATIVE VALUE OF SPINACH AND TOMATOES IN THE CHILD'S DIET

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TODAY probably no vegetable is considered more valuable in the diet of children than spinach. This belief is held not only by the population at large but by most physicians. One has only to glance through the daily papers or look at some of the comic strips to see evidences of its popularity. This belief in the great food value of spinach is based largely on its high iron, calcium, and vitamin content in the raw state. To obtain further information a study was made of the nutritional value of spinach as prepared for consumption, and for comparison similar studies were made on the almost universally available canned tomato.

In planning an investigation of this nature, it is essential that determinations be made on the product as prepared for consumption. So often we get our ideas of the nutritional value of foods from analyses of the raw product, when it is never eaten in that form. The losses of some of the food elements in the cooking of spinach are very striking. This is well illustrated by Chart 1, which shows a marked variation in the amount of vitamin B_1 in the raw and cooked product. This chart in addition demonstrates that the loss in this particular case is due not only to the cooking process itself, but also to the loss in the discarded cooking water.

TABLE I

TOTAL AND SOLUBLE IRON IN COOKED SPINACH AND CANNED TOMATOES, SOLUBLE IRON DETERMINED AFTER IN VITRO DIGESTION

MATERIAL	TOTAL IRON (MG. PER 100 GM.)	SOLUBLE IRON (MG. PER 100 GM.)
Cooked spinach	2.52	0.81
	1.85	0.57
	3.20	1.02
Average	2.52	0.80
Canned tomatoes	0.80	0.69
	0.72	0.56
	0.57	0.53
	0.66	0.62
Average	0.69	0.60

From the Laboratories of the Department of Pediatrics, University of Toronto, and the Hospital for Sick Children.

Read at the annual meeting of the American Pediatric Society, Hot Springs, Va., April 30, 1937, and at the fifteenth annual meeting of the Canadian Society for the Study of Diseases of Children, Niagara Falls, Ontario, June 11 and 12, 1937.

Iron.—The iron analyses which were made on a number of different samples of cooked spinach and canned tomatoes are given in Table I. It is seen from this that the total iron content per 100 gm. of cooked spinach is more than three times as high as that of 100 gm. of canned tomatoes. From this one might conclude that spinach should be the better source of iron for hemoglobin formation and regeneration. However, before iron can be utilized by the body it must go into solution in the intestinal tract. Using the procedure outlined by Summerfeldt[1] of duplicating in vitro the conditions found in the child's stomach, estimations were made of the iron which went into solution. The amount

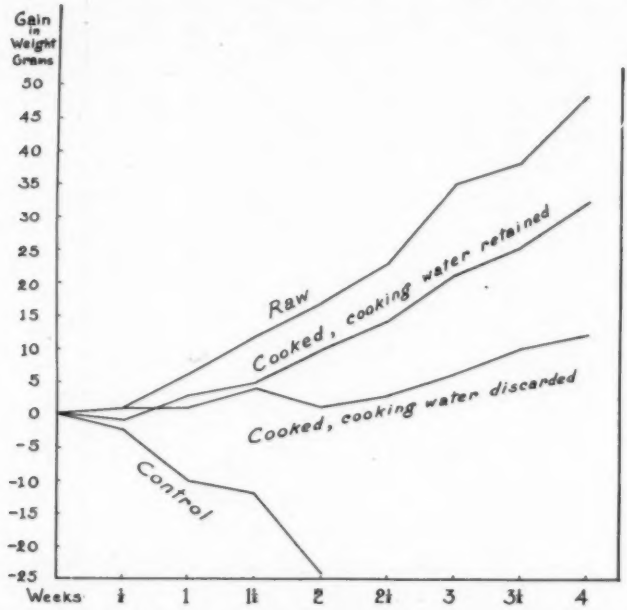

Chart 1.—Loss of vitamin B_1 content of spinach during the cooking process. Control animals were fed a vitamin B_1 deficient diet. Other groups were fed a daily supplement of 0.5 gm. of dehydrated raw spinach; dehydrated cooked spinach, the cooking water having been retained; dehydrated cooked spinach, the cooking water having been discarded before drying. This last product corresponds to spinach as consumed by the human being.

of soluble iron found in 100 gm. of cooked spinach and in 100 gm. of canned tomatoes is approximately equal (Table I). Hence, although the total iron content of the spinach is more than three times as high as that of the tomatoes, the amount of iron available for hemoglobin regeneration is approximately the same in the two vegetables.

The hemoglobin regenerating power of cooked spinach and tomatoes was determined biologically on anemic rats. Due to the necessity of feeding large amounts of cooked spinach and tomatoes to obtain the desired hemoglobin increase, both products were dehydrated to reduce

the volume.* The equivalent of 7.9 gm. of cooked spinach as prepared for human consumption (cooking water discarded) and 9.0 gm. of cooked tomatoes were fed daily. The spinach furnished 0.31 mg. of total iron, of which only 0.044 mg., or 14 per cent, was soluble as found by the previously mentioned technique. The tomatoes furnished 0.09 mg. of total iron, of which no less than 0.06 mg. was soluble. The hemoglobin increase was the same in both cases (Chart 2). This indicates that spinach and tomatoes are approximately of equal value as a source of iron for the prevention and cure of nutritional anemia.

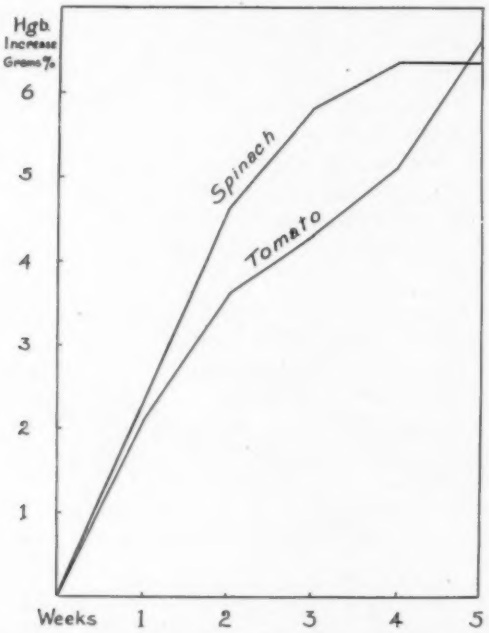

Chart 2.—Hemoglobin regenerating power of approximately equal amounts of fresh cooked spinach and canned tomatoes.

Hemoglobin regenerating power on anemic rats of the daily feeding of 641 mg. of dried cooked spinach (7.9 gm. fresh cooked spinach) containing 0.31 mg. of total iron; 378 mg. of dried cooked tomatoes (9 gm. canned tomatoes), containing 0.09 mg. of total iron. The anemia-producing diet of the animals contained an adequate supply of copper.

Calcium.—The amount of calcium in 100 gm. of cooked spinach and 100 gm. of canned tomatoes is shown in Table II. The calcium content of the cooked spinach is approximately 20 times that of canned tomatoes. It would appear from this that spinach should be a better nutritional source of calcium than canned tomatoes. However, Fincke and Sherman[2] have shown that the calcium of spinach is not as well utilized as the calcium in kale. This lack of availability of the calcium

*The authors are indebted to The Burbank Corporation, Burbank, Calif., for the dried cooked spinach and dried cooked tomatoes.

TABLE II

CALCIUM CONTENT OF COOKED SPINACH AND CANNED TOMATOES

MATERIAL	CALCIUM (MG. PER 100 GM.)
Cooked spinach	150.0
	258.0
	162.0
Average	190.0
Canned tomatoes	5.0
	7.9
	5.9
	7.5
Average	8.7

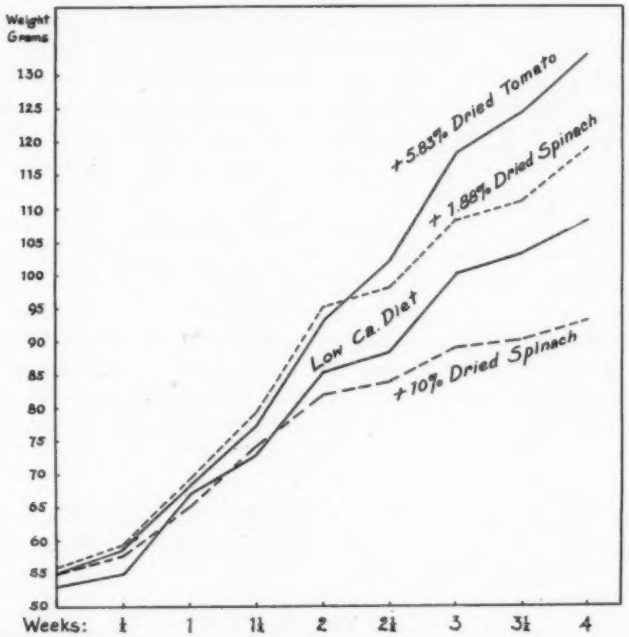

Chart 3.—The average weight gain on low calcium diet complemented with spinach and tomato.

of spinach may be due to its high oxalate content since under certain conditions oxalic acid will unite with calcium and precipitate out as the insoluble calcium oxalate. I. G. Macy (personal communication) found an average content of 0.7 gm. oxalic acid per 100 gm. of cooked spinach, a figure in agreement with the literature.[3] This amount of anhydrous oxalic acid will precipitate 0.334 gm. of calcium, approximately twice the amount of calcium contained in 100 gm. of cooked spinach (Table II). This means that in spinach there is sufficient oxalic acid to precipitate not only all the calcium furnished by this vegetable but additional calcium supplied by other foods.

In order to determine the availability of calcium in cooked spinach and also canned tomatoes, twenty-eight-day-old normal rats were placed on a low calcium diet devised by Dr. Elizabeth Chant Robertson (Appendix). The calcium content of this diet is 0.041 gm. per cent. The animals were carefully matched as to litter and sex. One animal from each set was killed at twenty-eight days of age, and after the gastrointestinal tract had been removed the whole animal was ashed according to Fincke and Sherman's technique,[2] and the calcium content determined. The remaining animals of each set were fed (a) the low calcium diet, (b) the low calcium diet with 10 per cent dried cooked spinach (cooking water discarded) replacing 10 per cent of the starch, (c) 5.83 per cent dried tomato replacing an equal amount of starch, and (d) 1.88 per cent of the dried spinach replacing an equal amount of starch in the diet. Five and eighty-three one hundredths per cent of dried tomatoes equals in wet weight the wet weight of the 10 per cent dried spinach, and 1.88 gm. of dried spinach contains the same amount of calcium as found in 5.83 gm. of dried tomatoes. The animals were carried along on these diets for four weeks.

In Chart 3 is shown the average weight increases of the four groups. At the end of one and one-half weeks the weights of the four groups of animals are approximately the same. After this time, however, during the next two and one-half weeks, the poorest gain was made by the animals getting the largest amount of spinach, and the best gain was made by the animals receiving the dried tomatoes. The average total food consumption per rat over the four-week period was 208 gm. for the controls, 204 gm. for the 10 per cent spinach group, 242 gm. for the 1.88 per cent spinach group, and 249 gm. for the 5.83 per cent tomato group.

After four weeks the animals were killed, the gastrointestinal tract removed, the animals ashed, and the total amount of calcium in their bodies determined (Table III).

TABLE III

EFFECT OF COOKED SPINACH AND COOKED TOMATO ON THE CALCIUM CONTENT OF THE WHOLE RAT

LITTER	SEX	28-DAY NORMAL ANIMAL (CA MG.)	56-DAY-OLD ANIMALS			
			LOW CALCIUM DIET (CA MG.)	LOW CALCIUM + 10% DRIED SPINACH (CA MG.)	LOW CALCIUM + 5.83% DRIED TOMATO (CA MG.)	LOW CALCIUM + 1.88% DRIED SPINACH (CA MG.)
A	M	412	462	376	564	478
A	F	408	472	356	472	408
B	M	428	432	384	550	–
B	F	416	498	416	566	–
C	F	496	564	466	660	558
D	M	404	428	370	484	–
Average		427	476	394	549	481

The 10 per cent dried spinach increased the calcium content of the diet by 0.115 gm. per cent, or an increase of 0.335 gm. per rat over the four-week period. In spite of this increase in the calcium consumed the total calcium in the animals at the end of the four weeks was actually less, with one exception, than the calcium content of comparable animals at the beginning of the observation. On the other hand, the addition of 5.83 per cent dried tomatoes, which increased the calcium con-

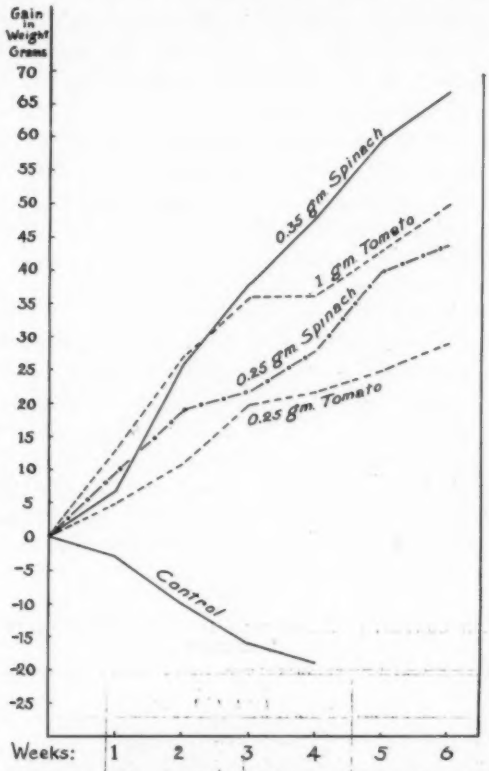

Chart 4.—Weight gain in vitamin A depleted animals, produced by cooked spinach and canned tomatoes.

tent of the control diet by 0.021 gm. per cent and the total intake of calcium per rat over the four-week period by only 0.052 gm., resulted in a marked increase in the amount of calcium in the bodies of the animals. The addition of 1.88 per cent cooked dried spinach to the control diet produced no appreciable change in the calcium content of the animals as compared with the calcium content of the controls. Thus a small increase in calcium intake furnished by the addition of canned tomatoes to a low calcium diet resulted in a marked increase in calcium

retention, while six times this increase of calcium as contained in cooked spinach actually produced a negative calcium balance.

From these results we can conclude that spinach instead of being a good nutritional source of calcium actually tends to produce a negative calcium balance. On the other hand, the retention of the calcium in cooked tomatoes is excellent.

Vitamin A.—The weight increase in vitamin A depleted animals produced by the daily addition of 0.25 gm. of cooked spinach is approximately the same as that produced by the daily administration of 1 gm. of canned tomatoes (Chart 4). From this we can conclude that the vitamin A content of cooked spinach is approximately four times as great as that of canned tomatoes.

Vitamin B_1.—It was found that the addition of 0.6 gm. daily of dried cooked spinach (cooking water discarded) to the diet of vitamin B_1 depleted animals produced an average weight gain of 12 gm. in a four-week period, while it required only 0.2 gm. of dried cooked tomatoes to produce a similar weight gain. On account of the bulk of these vegetables it was necessary to dehydrate them before feeding. The dehydration was done in a manner least likely to destroy any vitamins present. The daily amounts of dried vegetables consumed are equal to 8.4 gm. of cooked spinach and 4.8 gm. of canned tomatoes. Thus the vitamin B_1 content of cooked spinach is one-half that of cooked tomatoes.

Vitamin C.—The amount of cevitamic acid in different samples of cooked spinach and canned tomatoes was determined during the winter months by the indophenol titration procedure. The findings are recorded in Table IV, the average amount of cevitamic acid in the cooked spinach being 9.5 mg. per cent and in the canned tomatoes 15.8 mg. per cent.

TABLE IV

CEVITAMIC ACID CONTENT OF DIFFERENT SAMPLES OF COOKED SPINACH AND CANNED TOMATOES

SAMPLE	SPINACH (MG. %)	CANNED TOMATOES (MG. %)
1	6.9	16.9
2	10.7	11.5
3	16.7	18.5
4	8.7	14.7
5	4.5	18.8
6	3.4	16.5
7	9.1	18.2
8	9.9	16.7
9	16.5	14.6
10	9.3	12.5
Average	9.5	15.8

The amount of vitamin C in cooked spinach and canned tomatoes was also determined biologically. Guinea pigs were placed on a vitamin C deficient diet with the addition of varying amounts of cooked spinach and canned tomatoes. The spinach and tomatoes were fed

separately each day. It was impossible to give the animals more than 4 gm. of spinach daily. Chart 5 shows that on this amount of spinach the animals all died in eight weeks with marked evidences of scurvy. On the other hand, the animals fed 1 gm. of canned tomatoes daily survived for eleven weeks. The animals receiving 2 gm. of canned tomatoes daily gained in weight, and at the end of the thirteenth week showed only minimum evidences of scurvy.

It will be noted that while the chemical analyses show the average content of cevitamic acid in tomatoes as approximately twice that in cooked spinach, the biologic assays show that 4 gm. of cooked spinach is not as effective in preventing scurvy in the guinea pig as is 1 gm. of canned tomatoes.

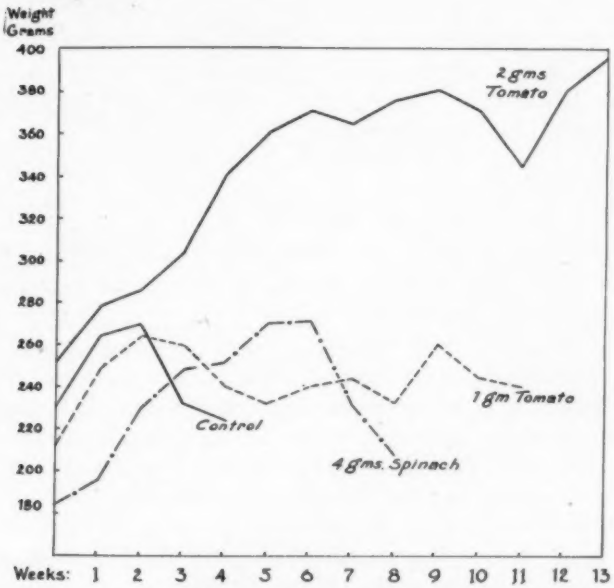

Chart 5.—Weight gain of guinea pigs on a vitamin C deficient diet plus cooked spinach and canned tomatoes.

Vitamin D.—The vitamin D content of cooked spinach and canned tomatoes was estimated according to the technique devised by Coffin.[4] The amount found in both instances was negligible, it requiring several hundred servings of either to furnish the amount of vitamin D in one teaspoonful of cod liver oil.

Loss in cooking.—To conserve minerals and vitamins, spinach must be cooked with a minimum amount of water. The necessary amount of water can be supplied by simply thoroughly washing the spinach, shaking the leaves, and then putting them directly into the cooking utensil. In many instances, however, larger amounts of water are used than is necessary.

TABLE V

TOTAL IRON, SOLUBLE IRON, AND CEVITAMIC ACID IN RAW AND COOKED SPINACH

	TOTAL IRON (MG.)	SOLUBLE IRON (MG.)	CEVITAMIC ACID (MG.)
100 gm. of raw spinach	2.28	2.28	8.0
100 gm. of raw spinach correctly cooked	1.56	0.50	5.6
100 gm. of raw spinach incorrectly cooked	1.26	0.39	1.9

In Table V are shown the amounts of total iron, soluble iron, and cevitamic acid in fresh, correctly cooked and incorrectly cooked samples of spinach. The cooking in every instance was carried out for 20 minutes, and the amount of water in the incorrectly cooked spinach was greater than necessary but not sufficient to cover the spinach when it was placed in the cooking vessel. It is evident that there is a very appreciable loss of these elements, the loss being greatly increased when the spinach is not correctly cooked.

On the other hand, canned tomatoes have already been cooked and may be served either without further cooking or with simply a brief heating period. There is naturally no water to be discarded. Determinations of the cevitamic acid content of canned tomatoes after the can has been opened show no appreciable loss over a period of four days when kept in a refrigerator.

Cost.—During the past winter in Toronto the cost of spinach has varied from 7 to 8 cents per pound, while in the summertime the price ranges from 5 to 7 cents per pound. At these figures, it is found that 100 gm. of cooked spinach costs on the average during the winter months 2.6 cents. The minimum summer cost is 1.73 cents. One hundred gm. of canned tomatoes cost in Toronto 1.8 cents, there being very little fluctuation in price. This difference in price, of course, must be borne in mind when the nutritional value of the two substances are considered from an economic standpoint.

SUMMARY

1. Cooked spinach and canned tomatoes are approximately of equal value as a source of iron for the prevention and cure of nutritional anemia in spite of the fact that the total iron content of cooked spinach is more than three times greater than that of canned tomatoes.

2. Spinach, although it contains 0.19 per cent calcium, an amount 20 times greater than that found in tomatoes, actually tends to produce a negative calcium balance. On the other hand, the retention of the calcium in cooked tomatoes is excellent.

3. The vitamin A content of cooked spinach is approximately 4 times as great as that of canned tomatoes.

4. The vitamin B_1 content of cooked spinach is approximately one-half that of cooked tomatoes.

5. The vitamin C content of cooked spinach is less than one-quarter that of canned tomatoes.

6. The vitamin D content of cooked spinach and canned tomatoes is negligible, it requiring several hundred servings of either to furnish the amount of vitamin D in one teaspoonful of cod liver oil.

7. A very appreciable loss of many of the food elements of spinach may occur in the discarded cooking water, even when the cooking is carried out under ideal home conditions. If these conditions are not observed the loss may be greatly accentuated. On the other hand, there is no water discarded in the preparation of tomatoes for consumption.

CONCLUSION

The nutritional value of spinach is greatly overrated. Sufficient prominence has not been given to the nutritional value of canned tomatoes.

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2. Fincke, M. L., and Sherman, H. C.: J. Biol. Chem. **110**: 421, 1935.
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APPENDIX

Composition of Diets

Iron deficient diet

Cream powder, 72% butterfat	6%
Whole milk powder	94%

Low calcium diet

Adequate diet without Ca

Casein A and B free (alcohol and acetic acid extracted)	18.0%
Cornstarch	62.2%
Crisco	10.0%
Yeast	6.0%
Cod liver oil	2.0%
Salt mixture	1.8%

Salt mixture

$K_2H\ PO_4$		219.72
K Cl		125.29
Na Cl		77.41
$Mg\ CO_3$		33.43
$Mg\ SO_4$ (anhydrous)		38.50
Fe Citrate $1\frac{1}{2}\ H_2O$	94.18	
Na F	3.68	
$Mn\ SO_4$	1.17	13.80
$K_2Al_2(SO_4)_4 \cdot 24\ H_2O$	0.67	
K I	0.30	
	100.00	

Vitamin A deficient diet

Cornstarch	60.0%
Alcohol extracted casein	18.0%
Crisco	10.0%
Dried yeast	5.0%
McCollum's salt mixture No. 51	4.0%
NaCl	1.0%
1D viosterol	2.0%

Vitamin B deficient diet

Autoclaved yeast	15.0%
Casein	18.0%
McCollum's salt mixture No. 185	4.5%
Cane sugar	61.5%
Cod liver oil	1.0%

Vitamin C deficient diet

Baked skimmed milk	30.0%
Bran	29.5%
Rolled oats	29.5%
Butterfat	10.0%
NaCl	1.0%
Cod liver oil	1.0%

IRON-COBALT TREATMENT OF PHYSIOLOGIC AND NUTRITIONAL ANEMIA IN INFANTS

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CHICAGO, ILL.

THE evidence pointing to the definitely stimulating effect of cobalt upon the rate of erythrocyte formation and hemoglobin regeneration was derived chiefly from experimental production of polycythemia in laboratory animals, such as rats;[22, 12, 13, 17, 3, 7] dogs;[11, 1] mice and guinea pigs;[18] rabbits;[8] and pigs.[17]

The mechanism of production of cobalt polycythemia has been carefully analyzed by Orten (1936), who concluded that it is one of stimulation rather than that of enhancing a passive accumulation of erythrocytes, since the cobalt-fed animals showed a higher reticulocytosis as compared with the control animals. This rise in the percentage of reticulocytes appears to be followed by an increase in the hemoglobin concentration of the blood and in the number of circulating erythrocytes. Mascherpa[11] likewise noted a stimulating action of cobalt upon the bone marrow, but assumed a similar effect upon the lymphopoietic organs, particularly the spleen, since he found an increased production of white blood cells in addition to the accelerated erythropoiesis. Schultze,[15] however, assumed that cobalt causes an increased formation of erythrocytes, while iron stimulates the formation of both erythrocytes and hemoglobin. In a more recent study, Barron and Barron[1] noted a decided decrease in oxygen consumption of erythrocytes in polycythemic rabbits, and this lowered physiologic function was held responsible for an increased production of the red cells. Furthermore, these authors emphasized the fact that powerful reducing agents, ascorbic acid for example, assisted in the maintenance of a determined level of red cells in the circulating blood. Again, the fact that the blood serum of cobalt-treated animals contains a higher concentration of bilirubin than that of normal animals may indicate an increased hemolysis which in turn stimulates erythropoiesis (Hooker,[5] Verzár, Arvay, Peter, and Scholderer[20]). Cobalt has also been found to produce a marked vasodilatation both in rabbits and in man (Le Goff[10]), which induces an undue accumulation of the blood in capillaries, particularly in the bone marrow, giving rise to a local anoxemia which favors increased erythropoiesis, as suggested by Reznikoff, Foot, and Bethea[14] in explaining the pathogenesis of polycythemia vera in man.

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Read before the forty-ninth annual meeting of the American Pediatric Society, Hot Springs, Va., April 30, 1937.

Whatever the explanation of the mechanism involved in the production of polycythemia may be, cobalt appears to be pre-eminently an effective catalyst in increasing both the hemoglobin content of the blood and in accelerating the formation of erythrocytes. For this reason, Schultze[15] and Sheldon[16] suggested its possible use as an hematinic agent in the treatment of anemia. In support of the validity of this suggestion both animal experimentation and clinical tests have been undertaken, and their results are briefly presented in the form of a preliminary report.

DETERMINATION OF COBALT DOSAGE

The effect of cobalt feeding in varying amounts was determined in the following manner. Six young rabbits from the same litter were

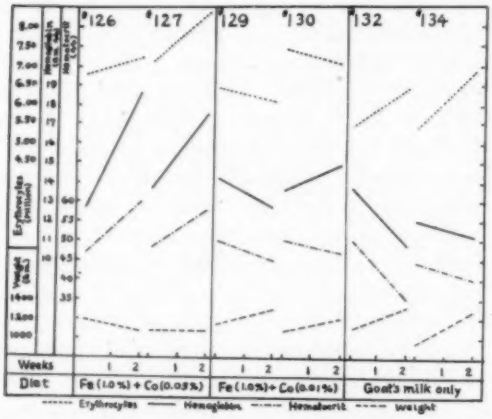

Fig. 1.—Effect of varying doses of cobalt upon hematologic values in rabbits.

divided into three equal groups, the first group receiving cobalt in the concentration of 0.05 per cent of the milk diet and the second group in that of 0.01 per cent, while the third formed a control group, being fed only with the goat's milk mixture. All animals were observed for a period of two weeks. The hematologic studies of these three groups at the beginning of the experiment and at the end of the observation period are presented in the graphic form (Fig. 1).

From these records it is clear that in rabbits cobalt in the concentration of 0.05 per cent exerted a markedly accelerating effect upon the number of circulating erythrocytes, the hemoglobin content and the hematocrit values during the observation period, but in the 0.01 per cent strength no such results were obtained. In the control group a tendency to the development of microcytic hypochromic type of anemia

was apparent, since the values for both hemoglobin and packed cell volume showed a decided fall while the red cell count showed a pronounced increase.

The hematologic findings in these animals have a peculiarly striking correlation with the conditions of their bone marrow. In the transparent preparation of lower extremities removed from these animals, the bone marrow of the long bones exhibit varying degrees of hyperplasia as judged macroscopically by the amount of dark red marrow developing in these bones. In the animals with pronounced polycythemia, the macroscopic characteristic develops in the extreme degree (Fig. 2-*D, E, F*). Histologically, this dark red marrow is seen to be due, for the most

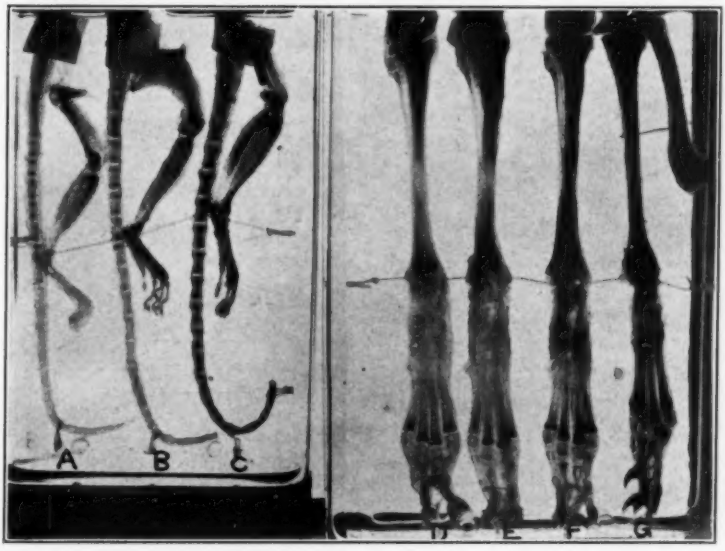

Fig. 2.—Transparent preparations (Spalteholz method) of animal tissues showing macroscopic evidence of increased hematopoiesis in the bone marrow. A, Tail and right lower leg of a rat with milk anemia; B, Tail and right lower leg of an anemic rat treated with cobalt and iron; C, Tail and right lower leg of a rat with polycythemia; D, Right lower leg of a rabbit on exclusive goat's milk diet; E, Right lower leg of a rabbit receiving 10 mg. cobalt daily; F, Right lower leg of a rabbit receiving 50 mg. cobalt daily; G, Right lower leg of a rabbit with polycythemia.

part, to the increasing degrees of cellular hyperplasia, while undoubtedly the passive hyperemia of medullary sinuses also contributes to the peculiarly dark appearance of the marrow (Fig. 3).

IRON-COBALT TREATMENT OF MILK ANEMIA IN ANIMALS

Simple nutritional anemia was produced in rats by an exclusive feeding of 50 per cent mixture of evaporated goat's milk. In the majority of animals so fed, the resulting anemia, developing within eight to ten weeks, was microcytic and hypochromic in nature. At the height of the

anemia, the iron-cobalt medication was initiated by adding to the diet 1 per cent of ferric ammonium citrate and 0.01 to 0.1 per cent of cobalt sulphate, with no change in the goat's milk mixture. The restoration of the normal erythrocyte and hemoglobin values in these animals was usually rapid and definite, requiring but from one to two weeks. In some instances even polycythemia was observed as early as after two weeks of treatment. Graphic records of some representative animals under treatment are reproduced in the accompanying chart (Fig. 4).

A histologic study of hemopoietic and other important organs revealed a number of significant findings worthy of a brief comment.

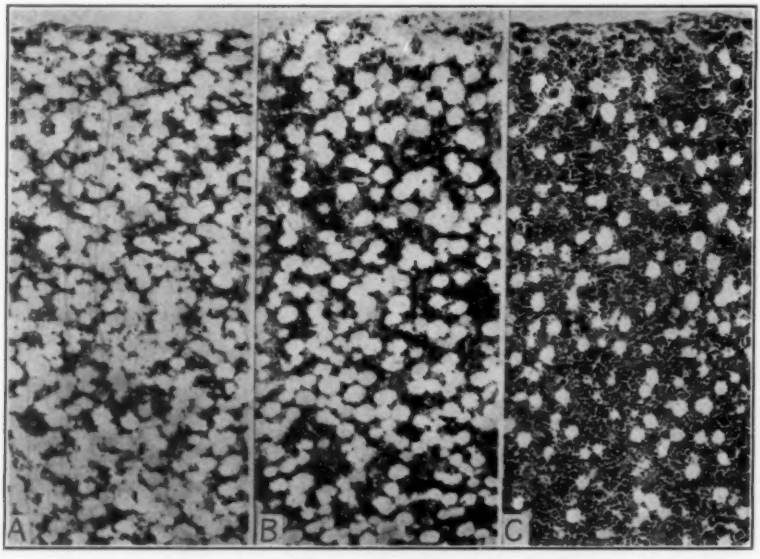

Fig. 3.—Histology of bone marrow (mid-femur) in rabbits.

Bone marrow: The most striking change following the administration of cobalt is a hyperplasia of the cellular marrow elements. The marrow macroscopically appears dark red due to three contributing factors: (1) intense proliferation of both the erythrogenic and leucogenic elements; (2) nearly complete disappearance of fat cells, and (3) pronounced dilatation and engorgement of sinusoidal spaces with the blood.

A rather interesting observation in this connection is the peculiar behavior of the marrow tissues in the tail segments of rats fed with cobalt. In tail segments the marrow undergoes fatty metamorphosis relatively early in postnatal life. This has recently been explained by Huggins and Blocksom[6] on the thermal basis, since the marrow temperature of the tail segments is decidedly lower than that of more centrally located bone marrow of the body. Hence these authors were able to

demonstrate the restoration of the red marrow in the distal segments of the tail by an operative insertion into the peritoneal cavity. However, a somewhat similar picture, readily demonstrated in the transparent preparations of the animals at various stages of iron-cobalt medication, is observed in the tail segments of rats fed with varying quantities of iron and cobalt, where no special attempt is made to regulate

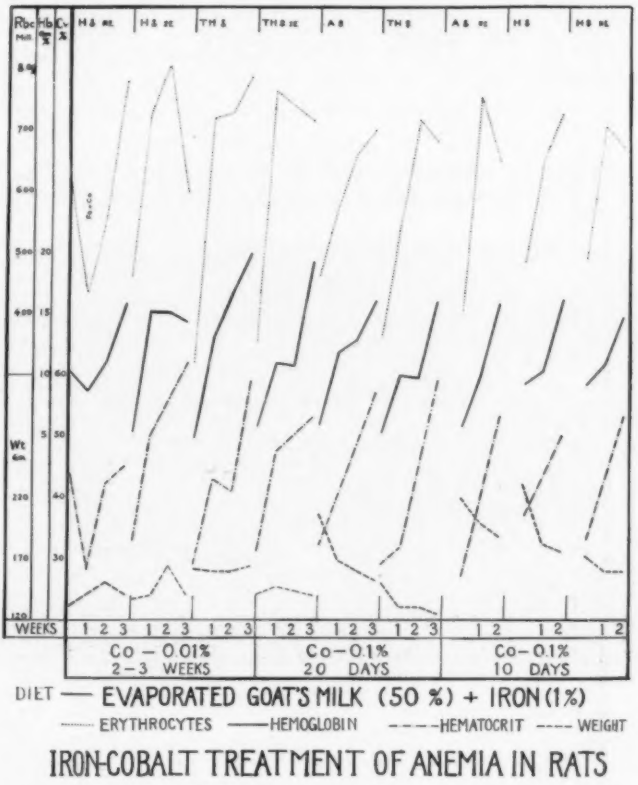
Rbc Mill.
Hb %
Cv %
Wt Gm.
WEEKS
1 2 3 1 2 3 1 2 3 1 2 3 1 2 3 1 2 3 1 2 1 2 1 2
Co – 0.01%
2–3 WEEKS
Co–0.1%
20 DAYS
Co–0.1%
10 DAYS
DIET — EVAPORATED GOAT'S MILK (50 %) + IRON (1%)
ERYTHROCYTES —HEMOGLOBIN ----HEMATOCRIT ---- WEIGHT
IRON-COBALT TREATMENT OF ANEMIA IN RATS

Fig. 4.—Hematology of iron-cobalt treatment of milk anemia in rats.

temperature (Fig. 2-*A, B, C*). A similar observation is also made in the metatarsal bones of the rabbit (Fig. 2-*D, E, F*).

In other words, administration of adequate doses of iron and cobalt in many instances converts the yellow bone marrow in a rat's tail or in a rabbit's metatarsal bones into the red marrow. Thus the proper dosage of this type of medication in the treatment of anemia in animals may be determined by the degree of such a transformation. Incidentally, this phenomenon ("rat's tail test," or "rabbit's metatarsal test") may be utilized to gauge the efficacy of any other chemical or physical therapeutic procedure employed in the treatment of milk anemia in animals.

TABLE I

SUMMARY OF COBALT ANALYSES IN ORGANS

ANIMAL	COBALT AMT. (PER CENT)	FED DAYS	TISSUE	WEIGHT MOIST ORGAN (GM.)	WATER CONTENT (PER CENT)	WEIGHT DRIED ORGAN (GM.)	COBALT IN DRIED MATERIAL (MG. PER CENT)	TOTAL COBALT PER ORGAN (MG.)
Rabbit								
156	0.10	11	Liver	37.8	77.4	8.55	8.89	1.14
			Kidneys	7.3	78.3	1.56	4.45	0.07
			Heart	2.6	82.1	0.46		-0.05
157	0.10	31	Liver	38.7	73.7	10.17	3.19	0.32
158	0.05	31	Liver	53.9	73.6	15.22	3.99	0.57
159	0.05	31	Liver	44.1	71.7	12.49	2.30	0.29
160	0.05	31	Liver	51.6	74.3	13.25	2.26	0.30
159 and 160	0.05	31	Kidneys, Heart, Spleen	17.4	74.3	4.47	3.19	0.14 (combined)
157 and 158	0.05	31	Kidneys, Heart, Spleen	18.8	76.7	4.38	2.86	0.13 (combined)
126	0.05	14	Liver	50.6	73.1	13.64	7.54	1.030
127	0.05	14	Liver	58.6	75.3	14.47	5.25	0.760
129	0.01	14	Liver	40.4	72.8	11.01	0.36	0.040
130	0.01	14	Liver	48.6	74.8	9.72	0.26	0.025
132	0		Liver	33.4		18.83		
134	0		Liver	33.5	71.9	(combined)	0	0
Rat Group / No. Rats								
1 (9)	0.10	10	Livers	63.7	76.2	15.13	14.33	0.310
2 (4)	0.10	20	Livers	45.2	75.2	11.12	8.51	0.240
3 (3)	0.01	21	Livers	16.5	70.7	4.85	1.40	0.023
4 (3)	0.01	14	Livers	15.6	70.4	4.59	1.26	0.019
5 (3)	0.01	14	Livers	16.6	72.6	4.49	1.33	0.020
3, 4, 5 (9)	0.01	14, 21	Pooled blood	38.9	69.9	11.75	Too low to read	

Chemical analyses above tabulated were made by Dr. Vivian Iob.

Other organs requiring brief comment are the liver and the spleen. Macroscopically the liver presents a dark red appearance and in sections the hepatic cords are found to be quite normal, while the sinusoids are greatly congested. By Mallory's aniline blue-orange G stain, no increase in the fibrous connective tissue can be demonstrated; hence no evidence whatever can be offered in support of the so-called "cobalt cirrhosis" which has been reported by a group of French observers.[21]

The spleen is outstandingly hyperemic, with a slight tendency to enlargement in size; microscopically the sections reveal a moderate hyperplasia of the malpighian bodies with an increase of mitotic figures in the germinal centers. The erythrogenic and leucogenic elements are definitely increased in the red pulp with a moderate number of mitotic figures. Megakaryocytes are also present, in some cases being ab-

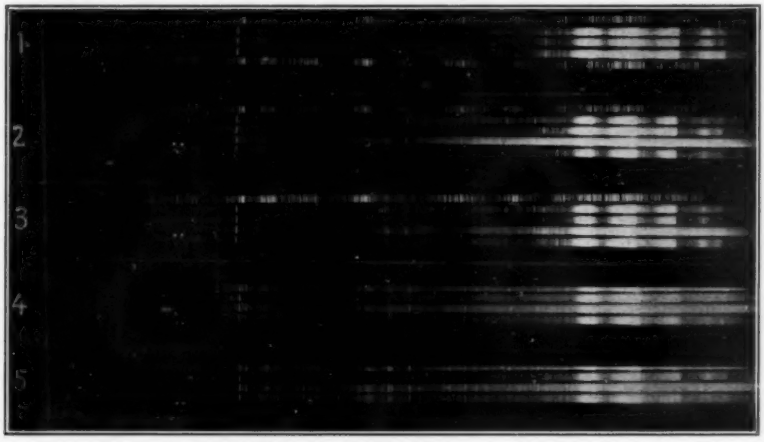

Fig. 5.—Cobalt spectrographs with controls.
1. (1) Fe; (2) cobalt (1%); (3) carbon; (4) cobalt (0.02%); (5) Fe.
2. (1) Fe; (2) cobalt plasma; (3) C; (4) normal plasma; (5) cobalt (1%).
3. (1) Fe; (2) normal plasma; (3) C; (4) normal plasma; (5) cobalt (1%).
4. (1) Cobalt red blood cells; (2) carbon; (3) cobalt red blood cells; (4) cobalt (0.2%).
5. (1) Normal red blood cells; (2) carbon; (3) normal red blood cells; (4) cobalt (0.2%).

normally increased. By the Mallory stain, no evidence of fibrosis can be discovered. Hemosiderosis of a mild degree is evident in both the liver and the spleen sections.

CHEMICAL AND SPECTROSCOPIC ANALYSES OF TISSUES

Chemical analyses of the organs of these cobalt-fed animals, by the colorimetric method of Stare and Elvehjem[17] revealed some significant results summarized in Table I.

The results, therefore, indicate rather conclusively the direct proportion of the amounts of cobalt stored in the organs to the quantities of

the metal fed. The liver apparently stores cobalt in the greatest concentration, while the absence of the metal in the blood is strikingly noteworthy.

Spectroscopic examinations of blood samples removed from the cobalt-treated animals (rats), even in the presence of pronounced polycythemia, failed to demonstrate cobalt lines. The most persistent lines (raies ultimes) of cobalt, according to the table of Gramont's sensitive and ultimate rays quoted by Twyman and Smith[10] are 2388.9 and 2378.6 A° in the ultraviolet, which are strongly visible in the spectrograph made from a 0.02 per cent solution of cobalt sulphate. The inference, therefore, is that cobalt is either absent altogether both in the plasma and in the red cells of these animals, or else it is present in a concentration too small for spectroscopic demonstration (Fig. 5). Furthermore, these results indicate that cobalt in all likelihood acts merely as a catalyst in the erythropoiesis without actually forming chemical compounds in any intermediate stages of hemoglobin synthesis as at one time assumed by Laidlaw[9] and Mascherpa[11] to be the case.

IRON AND COBALT IN NUTRITIONAL ANEMIA OF INFANTS

With the information at hand as to the relation of cobalt to the blood, as gathered from the foregoing data, a therapeutic test of this metal was undertaken in a group of 55 infants suffering from varying degrees of physiologic and nutritional anemia. The diagnostic criterion of anemia was arbitrarily set at the hemoglobin level of any reading below 11.0 gm. per cent as determined by the acid hematin method of Newcomer, although a few infants with hemoglobin values slightly above this level were included in the present study. With a standard basic age diet prescribed to all these infants the plan of treatment for the most part consisted in first administering adequate dosage of ferric ammonium citrate (0.5 gm. daily). Cobalt (25 to 50 mg.) was then added to the medication in 37 infants (67 per cent) in whom the hemoglobin failed to rise at all or, at best, but slightly. In 18 infants (33 per cent), however, both iron and cobalt were prescribed from the outset of treatment. Nine infants (17 per cent) showing a satisfactory increase in hemoglobin

TABLE II

Total number of infants observed	55
Number of infants with satisfactory progress with iron alone	9 (17 per cent)
Number with satisfactory progress with iron and cobalt	42 (76 per cent)
Number with no effect with iron and cobalt	4 (7 per cent)
Average initial hemoglobin (gm. per cent)	9.9
Average final hemoglobin (gm. per cent)	12.2
Average initial red cell count (millions)	4.19
Average final red cell count (millions)	5.06
Average initial packed cell volume (per cent)	33.1
Average final packed cell volume (per cent)	37.5

under iron medication alone received no cobalt treatment. The results of treatment are summarized in Table II.

The majority of infants who made a significant gain in hemoglobin, red cell count and hematocrit value, did so within the first two weeks of iron-cobalt treatment although the final results as tabulated were obtained after three to four weeks of continuous medication. The average weekly increase in the hematological values is summarized in table III.

TABLE III

	INITIAL	FIRST WEEK	SECOND WEEK	FINAL
Erythrocytes (millions)	4.19	4.36	4.61	5.06
Hemoglobin (grams per cent)	9.9	10.7	11.6	12.2
Hematocrit (per cent)	33.1	34.9	35.8	37.5

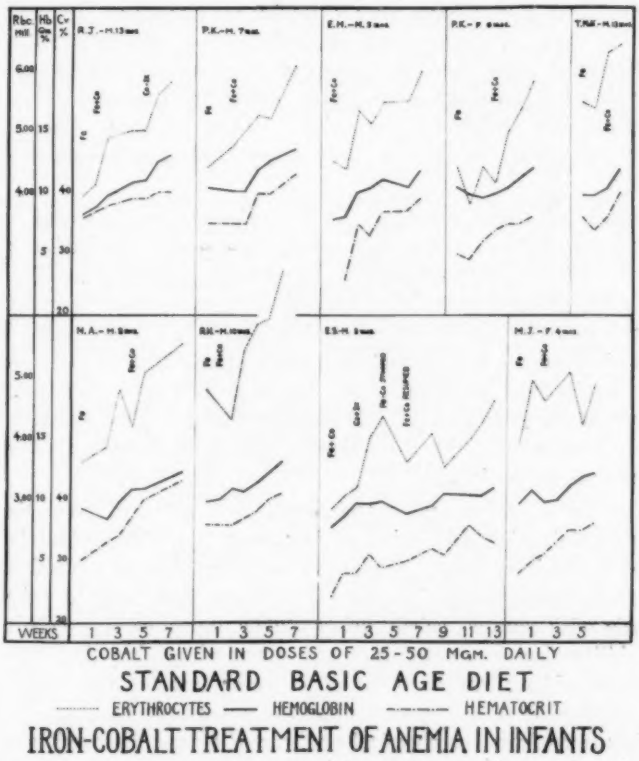
Rbc mil
Hb Gm %
Cr %
WEEKS
1 3 5 7
1 3 5 7
1 3 5 7 9 11 13
1 3 5
COBALT GIVEN IN DOSES OF 25-50 MGM. DAILY
STANDARD BASIC AGE DIET
ERYTHROCYTES — HEMOGLOBIN -·-·- HEMATOCRIT
IRON-COBALT TREATMENT OF ANEMIA IN INFANTS

Fig. 6.—Iron-cobalt treatment of nutritional anemia in infants.

From the table it is clear that all three fundamental values increased in parallel progression. Typical records of individual cases are given in graphic forms (Fig. 6).

COMMENT

The clinical trial of iron-cobalt combination treatment as applied to physiologic and nutritional anemia of infants has yielded favorable results in that 76 per cent of such infants showed a definite increase in hematologic values. Seventeen per cent of anemic infants made satisfactory progress under iron treatment alone, while 7 per cent of the group, in spite of the iron-cobalt treatment, showed no effect whatever. Broadly speaking, however, the failure of these cases to respond was largely attributable to the counteracting influence of infection or gastrointestinal disturbances. Clinically the testimony of the mothers who cooperated in this study was almost unanimously encouraging. In nearly every case of where the infant had been fretful, restless, pale, and lacking in vigorous appetite previous to treatment, definite improvement in these symptoms was noted soon after the institution of treatment with iron and cobalt. Simultaneous measurement of body weight was impracticable in most instances, since the infants were brought at weekly intervals for hematologic studies only and circumstances did not permit the babies to be weighed at each visit. In the few cases where a weight record was made, the gain in body weight was quite normal and satisfactory.

Hematologically, the increase in the red cell count, hemoglobin, and packed cell volume under iron-cobalt treatment described a parallel course. The red cell count made an average weekly gain of approximately 250,000 per c.mm., the hemoglobin concentration from 0.6 to 0.9 gm. per cent and the hematocrit value from 1 to 1.5 per cent. In only a few instances did the red cell count, after three to four weeks of cobalt medication, begin to exceed the six million mark. The individual records of these treated infants reveal definite evidence that addition of cobalt accelerated the utilization of iron in hemoglobin synthesis and erythrocyte formation.

From the chemical and spectroscopic data obtained from tissues of experimental animals it is also of interest to note that cobalt is chiefly stored in the liver where it may gradually be used as a blood catalyst. The fact that no cobalt lines were seen in the blood samples taken from animals with marked cobalt polycythemia indicates that cobalt in all probability does not enter into any chemical combination with blood elements, adding further proof of its being but a simple catalyst. A significant observation bearing upon the importance of cobalt in animal life has come from the chemical analysis of organs removed from sheep suffering from "bush sickness" in New Zealand. Askew and Dixon, as quoted by Denham,[4] found that the liver, pancreas, and blood of affected sheep contained very much less cobalt than corresponding organs from healthy sheep. Frequently the amount of cobalt in the affected livers was only one-tenth that found in the livers of healthy sheep. Un-

doubtedly, a more extensive study on the cobalt status of animal organs than here presented is necessary in order to evaluate the essentiality of the metal.

While moderately toxic in large doses, cobalt in the small amounts (25 to 50 mg. daily) prescribed to the anemic infants in the present study has been found to be consistently free from any harmful effect. Practically all infants took iron and cobalt quite readily, when added to either the formula, cereal, vegetables, or fruit juices. As judged from the histologic study of the livers of polycythemic animals it is evident that in administration of cobalt no pathologic changes are to be expected in this organ in spite of its being the principal organ of storage for this metal.

SUMMARY AND CONCLUSIONS

Cobalt when administered in a dosage approximately one-tenth that of iron appears to accelerate the formation of red blood cells and hemoglobin. This effect is probably due to the catalytic action of the cobalt salt since no evidence of its presence in the blood is demonstrable by the spectroscopic method.

Cobalt seems to stimulate primarily the bone marrow which undergoes progressive hyperplasia of all cellular elements with a consequent discharge of erythrocytes into the circulation. The parallel increase in the hemoglobin value and in the packed cell volume is probably the result of the accelerated erythropoiesis.

The optimum therapeutic dose of cobalt sulphate is 25 to 50 mg. daily for infants under two years of age, administered in combination with 0.5 gm. of assimilable iron. With this medication the average gain in the red cell count is approximately 250,000 weekly, in the hemoglobin content 0.75 gm. per cent, and in the hematocrit reading 1.5 per cent.

If the probable action of cobalt in hemopoiesis is only that of a catalyst, then it is to be used only as an adjunct to iron therapy during the first two or three weeks of active treatment of simple nutritional anemia. After the maximal normal limits of 12 to 13 gm. per cent in hemoglobin concentration have been reached the medication may be entirely withheld or the iron alone may be continued.

With the dosage of cobalt and the duration of its administration here recommended no alarming pathologic changes can be produced in any of the vital organs of the body.

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THE METABOLISM AND EXCRETION OF BILE PIGMENT IN ICTERUS NEONATORUM

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THE authors have carried out the present investigation in the hope of elucidating the problem of the causation of icterus neonatorum. It is generally accepted that three main factors may separately or in combination take part in the production of jaundice: excessive hemolysis, impaired function of the liver cells, and obstruction in the biliary channels. It is well recognized that excessive hemolysis does take place in the neonatal period of an infant, as a physiologic adaptation of the blood to extrauterine conditions (Goldbloom).[1] As a result, excessive bilirubin is formed and the concentration of this substance in the blood is increased. When it reaches a certain height in the blood, clinical jaundice appears. Certain investigators have claimed that this type of jaundice depends entirely upon the amount of hemolysis taking place and that the rise in the bilirubin content of the blood is due entirely to this factor. They suggest that if the production of bile pigment resulting from hemolysis reaches high levels, even normally functioning liver cells are unable to excrete this bile pigment at a sufficiently rapid rate to prevent jaundice. It is also felt by these investigators that there is no evidence of obstruction in the biliary channels. It is, in other words, a purely hemolytic jaundice.

The authors have investigated the problem in three ways. In the first place, a study of the blood was made in a group of normal infants, to observe if there was any evidence of excessive hemolysis in those who showed jaundice. Examination of each infant was made on the first and fifth days of life. The examination included the red cell count, the percentage of hemoglobin, the percentage of packed red cells to the total blood, i.e., corpuscular volume percentage, and the van den Bergh reaction. Twelve infants were examined and of these, five had jaundice on the fifth day, whereas seven had no jaundice. As might be expected, the bilirubin content of the blood in those infants with jaundice was consistently higher than in those without jaundice. The red cell count showed wide variations, between 4,600,000 and 7,500,000 at birth. The hemoglobin percentage varied between 98 and 139 at birth, and the corpuscular volume between 49 and 75 per cent. In both groups of cases, there was a significant drop in these three concentrations by the fifth day. Table I shows the comparative figures in the two groups.

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TABLE I

COMPARISON OF THE AVERAGE REDUCTION IN RED CELL COUNT, HEMOGLOBIN PERCENTAGE, AND CORPUSCULAR VOLUME PERCENTAGE BETWEEN THE FIRST AND THE FIFTH DAY IN INFANTS WITH AND WITHOUT JAUNDICE

NUMBER OF INFANTS WITH JAUNDICE 5
NUMBER OF INFANTS WITHOUT JAUNDICE 7

	AVERAGE RED CELL COUNT	AVERAGE HEMOGLOBIN PERCENTAGE	AVERAGE CORPUSCULAR VOLUME PERCENTAGE
Jaundice Cases			
First day	6,650,000	114	59
Fifth day	5,975,000	104	53
Percentage reduction	10	9	10
Without Jaundice			
First day	5,900,000	110	58
Fifth day	5,270,000	98	52
Percentage reduction	12	11	11

As will be seen from Table I, the average reduction in red cell count, in hemoglobin percentage, and in total corpuscular volume was practically equal in both groups, although there were marked individual variations. This finding suggests that an equal degree of hemolysis took place in both groups, and is brought forward as evidence that excessive hemolysis alone is not the factor upon which the development of jaundice depends.

In the second part of the investigation, blood studies were carried out on a group of sixty-three infants, all of the age of four or five days, the period at which jaundice, if present, is usually most intense. Twenty-two of these infants were visibly jaundiced, while forty-one showed none. The blood examination included the hemoglobin percentage, the corpuscular volume percentage, and the van den Bergh

TABLE II

SHOWING HEMOGLOBIN PERCENTAGE, CORPUSCULAR VOLUME PERCENTAGE, VAN DEN BERGH REACTION AND BILIRUBIN EXCRETION BY KIDNEYS IN INFANTS WITH AND WITHOUT JAUNDICE

AGE OF INFANTS—FOUR OR FIVE DAYS
NUMBER OF INFANTS WITH JAUNDICE 22
NUMBER OF INFANTS WITHOUT JAUNDICE 41

	WITH JAUNDICE	WITHOUT JAUNDICE
Average hemoglobin percentage	113.0	109
Average corpuscular volume percentage	52.5	52
van den Bergh		
Direct prompt	Negative	Negative
Direct delayed	Positive	Positive
Indirect	10.1 units average	4.4 units average
Average bilirubin excretion		
Mg. per 100 c.c. urine	0.008	
	Present in all except 4 cases	Absent in all except 3 cases

reaction, direct and indirect. On the same day, urine samples were obtained from these infants and this was tested for the presence or absence of bilirubin by the van den Bergh reagent. Table II illustrates the findings obtained.

In the patients with jaundice, the hemoglobin percentage varied between 131 and 97. The average was 113. The corpuscular volume percentage varied between 60 per cent and 45 per cent, with an average of 52.5 per cent. In the patients without jaundice, the hemoglobin percentage varied between 136 and 80, with an average of 109. The corpuscular volume percentage in this latter group varied between 60 per cent and 38 per cent, with an average of 52 per cent.

It will be observed that the hemoglobin percentage was slightly higher in the jaundiced than in the nonjaundiced patients, and that the corpuscular volume percentage was almost identical. As in the previous experiment, these findings provide further evidence against the hypothesis that greater hemolysis has taken place in the jaundiced than in the nonjaundiced cases.

A study of the van den Bergh reaction in the blood serum of these patients gave the following information. In none of the patients, whether jaundiced or not, did the blood show a direct prompt reaction. It is generally admitted, on the basis of clinical evidence, that this type of reaction is present only in jaundice resulting from obstruction of the biliary channels. That being so, these findings suggest that this type of icterus is not due to obstruction of the large or small biliary channels. The delayed direct reaction, however, was present in all cases, as one would expect in any case of hyperbilirubinemia not due to obstruction. The indirect (or quantitative) reaction was definitely higher in the patients with jaundice than in the nonjaundiced. It averaged 10.1 units in the jaundiced. The levels varied between 16 and 3 units, with only one falling below 5 units. In the patients without jaundice, the average level was 4.4 units. The levels varied between 14 and 0.5 units with only six above 5 units. Of these six, the three who showed the highest level in the blood, namely 14, 13, and 10 units, all showed bilirubin in the urine and will be discussed in the next paragraph.

Examination of the urine in this group showed that bilirubin was consistently present in the patients with jaundice, being absent in only four. It appears to be closely dependent upon the height of bile pigment concentration in the blood and not upon the presence of the prompt direct van den Bergh reaction. In other words, it does not depend upon the presence of the type of bile pigment present in true obstructive jaundice and hence is not, in itself, evidence of obstruction in the biliary channels. In the urine of infants without jaundice, bilirubin was absent in all except three. In these, as mentioned above, the indirect van den Bergh reaction in the blood gave readings of 14, 13, and 10 units. One feels that, in these cases, jaundice was present and was

TABLE III

COMPARATIVE EXCRETION OF UROBILIN IN STOOLS OF INFANTS WITH AND WITHOUT JAUNDICE. FIGURES REPRESENT AVERAGE DAILY OUTPUT IN MILLIGRAMS

NUMBER OF INFANTS WITHOUT JAUNDICE	21
NUMBER OF INFANTS WITH JAUNDICE	14

DAY	1	2	3	4	5	6	7
WITHOUT JAUNDICE			33.5	44.4	37.5	57.7	69.3
WITH JAUNDICE			22.0	24.8	38.2	24.1	40.6

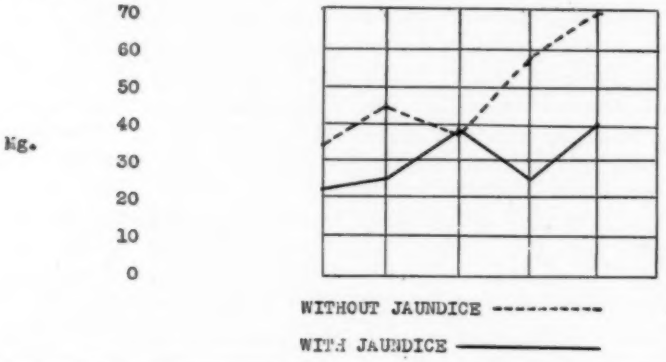
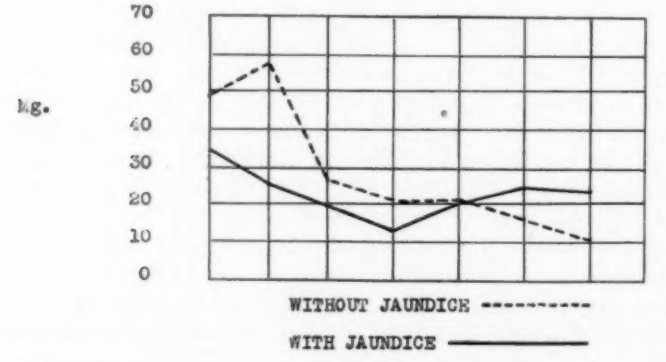


TABLE IV

COMPARATIVE EXCRETION OF BILIRUBIN IN STOOLS OF INFANTS WITH AND WITHOUT JAUNDICE. FIGURES REPRESENT AVERAGE DAILY OUTPUT IN MILLIGRAMS

NUMBER OF INFANTS WITHOUT JAUNDICE	21
NUMBER OF INFANTS WITH JAUNDICE	14

DAY	1	2	3	4	5	6	7
WITHOUT JAUNDICE	48.2	57.5	27.3	21.1	21.3	16.8	11.5
WITH JAUNDICE	34.8	26.4	19.9	13.2	21.0	24.9	23.9



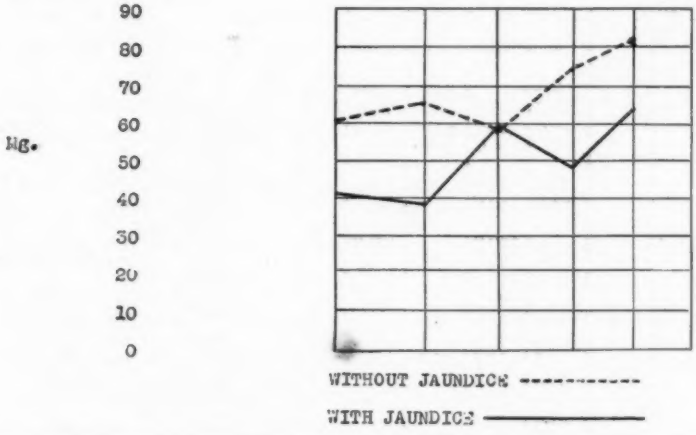
missed by faulty observation. Marked erythema neonatorum at times renders the observation of jaundice difficult.

To summarize: the second part of this study provides further evidence that excessive hemolysis does not take place in this type of jaundice. The consistent absence of the prompt, direct van den Bergh reaction, on the other hand, is opposed to the thesis that obstructive factors in the biliary channels play any part in this type of jaundice. We also note that the presence of jaundice is closely related to the height of bilirubin in the blood serum. When the bilirubin in the blood serum reaches heights at which jaundice is present, bilirubin is nearly always present in the urine.

TABLE V

COMPARATIVE COMBINED EXCRETION OF UROBILIN AND BILIRUBIN IN STOOLS OF INFANTS WITH AND WITHOUT JAUNDICE. FIGURES REPRESENT AVERAGE DAILY OUTPUT IN MILLIGRAMS

NUMBER OF INFANTS WITHOUT JAUNDICE					21		
NUMBER OF INFANTS WITH JAUNDICE					14		
DAY	1	2	3	4	5	6	7
WITHOUT JAUNDICE			60.8	65.5	58.8	74.5	80.8
WITH JAUNDICE			41.9	38.0	59.2	49.0	63.5



In the third part of the investigation, a study was made of bile pigment excretion in the stools and urine of infants during the first seven days of life. Thirty-five infants were studied in this manner. Of these, fourteen were jaundiced and twenty-one nonjaundiced. A quantitative estimation was made of the urobilin and bilirubin (including biliverdin) excretion in the stools. The combination of these two gave a fairly accurate measure of the total bile pigment excretion in the feces of these infants. Accurate estimation of urobilin excretion in the first two days

TABLE VI

INFANTS WITH JAUNDICE, DAILY EXCRETION IN STOOLS OF UROBILIN AND BILIRUBIN IN MILLIGRAMS

	UROBILIN					BILIRUBIN						
Day	3	4	5	6	7	1	2	3	4	5	6	7
Patient:												
1		0.6	0.3			36.0	29.0	30.0	9.5	15.0	21.0	36.9
2			40.1	51.2	51.2				11.2	12.7	8.9	6.3
3	28.0	22.6				59.0	57.2	10.5	14.8			
4						42.5	2.0	7.0		9.7	12.5	
5						44.2	37.5	15.4		10.4	35.0	21.3
6	20.8	30.8				51.0	4.0	10.0	8.0			
7	17.6	24.8					14.0	10.0	5.1	2.6		
8	40.8	20.8	60.8			20.4	14.3	10.2	5.1	6.5		
9		48.8	120.8	24.8		81.6	17.6	6.6	2.0	5.1	5.7	
10				14.1		1.5	14.6	10.2	22.3	20.4	15.3	
11	6.8	40.8	21.5	35.2	30.0	1.7	15.3	11.5	30.6	33.2	13.1	31.4
12	17.9	20.8				10.2	38.2	30.6	22.1			
13			3.2	2.2				85.8	18.1	63.0	81.6	
14		12.8		16.8			72.5	21.4	10.0	12.8	20.4	
Daily average excretion	22.0	24.8	38.2	24.1	40.6	34.8	26.4	19.9	13.2	21.0	24.9	23.9

TABLE VII

INFANTS WITHOUT JAUNDICE, DAILY EXCRETION IN STOOLS OF UROBILIN AND BILIRUBIN IN MILLIGRAMS

	UROBILIN					BILIRUBIN						
Day	3	4	5	6	7	1	2	3	4	5	6	7
Patient:												
1	8.5	75.8	125.01	125.0	86.5	63.8	198.0	47.0	33.0	28.4	28.4	18.3
2						18.4	12.5	7.5				
3	8.5		18.4	30.0	41.4	55.3	167.0	40.3	15.8	27.4	10.6	13.0
4	251.0	90.0	74.1	96.3				10.0	24.5	17.5	15.9	
5	39.4	26.2	43.0	65.3	76.0	27.3	29.0	2.0	0	0	2.0	0
6		9.0	15.0	30.0		28.0	19.6	16.0	17.0	1.3	10.0	
7						27.6	69.6					
8	7.61	32.6				51.0	41.0	28.9	0			
9	24.8	40.8				25.0	30.0	16.3	4.4			
10						34.0	52.4	23.0				
11		100.8		120.8		10.2	26.2	15.3	10.2	5.0		
12	13.6	80.3	12.4	12.4				12.8	10.6	29.9	30.0	
13	24.8						17.0	18.5				
14		37.2	40.8	60.8			38.0	41.5	35.7	30.7	28.2	
15	16.8	15.8	19.2			51.0	37.5	42.0	26.0	45.0		
16	15.8	12.8				76.5	26.8	52.8	45.0			
17	17.8	17.8	30.8			47.3	15.0	26.8	34.5	22.1		
18	16.0	15.3	21.6			84.0	47.0	31.0	20.2	16.0		
19	19.1	29.0	24.2	32.7		0	168.7	46.0	30.0	15.0	18.0	
20	11.0					85.0	28.4	28.0				
21	21.1	23.3	25.5	4.3	23.3	87.0	67.4	35.0	31.0	18.7	19.9	15.0
Daily average excretion	33.5	44.4	37.5	57.7	69.3	48.2	57.5	27.3	21.1	21.3	16.8	11.5

of life was not possible, due to technical difficulties (which have lately been overcome), so that the comparative figures for the last five days are those which will occupy our attention principally. These results are shown in Tables III, IV, V, VI, and VII.

If one observes these tables, the following findings appear to be of significance. In the first place, one notes the relatively high urobilin

excretion in both groups of cases. This is what one would expect as a result of the excessive blood destruction taking place in the body. The amount of excretion tended to increase with each succeeding day. The urobilin excretion in the cases without jaundice gave a definitely higher average than in the cases with jaundice. If one examines the figures for the combined excretion of urobilin and bilirubin (including biliverdin) in the two groups of cases, it is of interest to note that in the group of infants without jaundice the total excretion of bile pigment is greater than in the patients with jaundice. In a purely hemolytic type of jaundice, without any interference with excretion, the reverse would be expected, as excessive hemolysis should result in excessive excretion of the end products. The inference might, therefore, be drawn that one of two factors—either a functional disturbance of the liver cells or an obstruction in the bile channels—was present to interfere with the excretion of the bile pigment in those patients developing jaundice. Now, in the previous investigation, the absence of the prompt direct van den Bergh reaction in the blood of the jaundiced patients provided evidence against the presence of true biliary obstruction. By a process of exclusion, it appears that the other factor—either liver-cell damage or delayed functional activity of the cell—may be the deciding factor.

The excretion of urobilin and bilirubin in the urine of this group of patients is charted in Tables VIII, IX, X, and XI. In the case of urobilin excretion, one notes the increase over normal excretion in both

TABLE VIII

COMPARATIVE EXCRETION OF UROBILIN IN URINE OF INFANTS WITH AND WITHOUT JAUNDICE. FIGURES REPRESENT AVERAGE DAILY OUTPUT IN MILLIGRAMS

NUMBER OF INFANTS WITHOUT JAUNDICE 21
NUMBER OF INFANTS WITH JAUNDICE 14

DAY	1	2	3	4	5	6	7
Without jaundice	0.23	0.31	0.59	1.08	1.21	1.31	1.72
With jaundice	0.16	0.49	0.56	0.80	0.87	1.06	1.12

TABLE IX

COMPARATIVE EXCRETION OF BILIRUBIN IN URINE OF INFANTS WITH AND WITHOUT JAUNDICE. FIGURES REPRESENT AVERAGE DAILY OUTPUT IN MILLIGRAMS

NUMBER OF INFANTS WITHOUT JAUNDICE 21
NUMBER OF INFANTS WITH JAUNDICE 14

DAY	1	2	3	4	5	6	7
Without jaundice	0.004	0.003	0.006	0.006	0	0	0
With jaundice	0.023	0.039	0.048	0.059	0.060	0.044	0.020

All patients with jaundice showed bilirubin in the urine.
Only five patients without jaundice showed trace of bilirubin in urine.

TABLE X

INFANTS WITH JAUNDICE, DAILY EXCRETION IN URINE OF UROBILIN AND BILIRUBIN IN MILLIGRAMS

	UROBILIN							BILIRUBIN						
Day	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Patient:														
1	0.16	0.30	0	0	0	0	0.29	+	++	++	++	++	++	+
2				1.15	1.62	2.06	3.07				0.083	0.133	0.027	0.020
3	0.24	0.86	0.96	0.29				0	0	0.077	0			
4	0.14	0	0	0	0	0		0.085	0.100	0.180	0.230	0.190		
5		0.38	1.15	0.70	0.17	0			0.095	0.114	0.205	0.143	0.217	
6	0	0.43	0.29	2.60				0.090	0.120	0.170	0.160			
7		0.84	1.25	1.71	1.40				0.080	0.010	0	0		
8	0.28	1.90	0.36	1.80	1.50			0.010	0.024	0.004	0.027			
9	0.49	0.73	0	1.30	0.93	1.02		0	0.006	0.010	0.018	0.010	0.010	
10	0.19	0.45	0.87	0.58	0.92	1.07		0	0	0	0.006	0.006	0.007	
11	0	0	0.51	0	0	0	0	0.001	0.005	0.010	0.020	0.045	0.022	
12	0	0	0	0.02				0	0	0.001	0.010			
13			1.21	1.00	0	1.84				0.001	0	0.001	0.002	
14		0	0.31	0	2.99	3.52			0	0.010	0.010	0.014		
Daily average excretion	0.16	0.49	0.56	0.80	0.87	1.06	1.12	0.023	0.039	0.048	0.059	0.060	0.044	0.020

TABLE XI

INFANTS WITHOUT JAUNDICE, DAILY EXCRETION IN URINE OF UROBILIN AND BILIRUBIN IN MILLIGRAMS

	UROBILIN							BILIRUBIN						
Day	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Patient:														
1	0	0.19	0.49	0.96	3.90	1.40	2.80	0	+	+	0	0	0	0
2	0	0.30	0.14		0.14			0	0	0	0			
3	0	0	0.36	0.37	0.53	0.38	0.58	0	0	0	0	0	0	0
4	0.80	0.94	2.14	0	0	0		0.02	0	0.02	0	0	0	0
5	0.40	0.30	0.70	1.96	3.46	2.26		0	0	0	0	0	0	
6	0.17	0	1.15	2.40	1.15	1.10		0.04	0.02	0	0	0	0	
7	0.38	1.06						0	0					
8		0	0	2.99					0	0	0			
9	0.14	0	0	0.53				0.004	0.001	0.08	0.10			
10	0.97	1.24	1.45	2.02	1.21			0	0	0	0	0	0	
11		0.16	0.28	0.35	0.32	0.28		0	0	0	0	0	0	
12			0.24	0.62	0.26	0.34				0	0	0	0	
13		0	0											
14		0	0.38	0.68	1.42	1.76			0	0	0	0	0	
15	0.17	0.24	0.59	0.96	1.35			0	0	0	0	0		
16	0.10	0.47	0.70	0.99				0	0	0	0	0		
17	0.10	0.31	1.00	0.73	0.54			0	0	0	0	0		
18	0	0.22	0.34	0.52	0.97			0	0	0	0	0		
19	0	0	0.24	0.38	2.04	3.62		0	0	0	0	0		
20		0.38	0.61	0.94				0	0.023	0				
21	0.28	0.37	1.00	0.72	0.98	2.04	1.80	0	0.005	0.006	0	0	0	0
Daily average excretion	0.23	0.31	0.59	1.08	1.21	1.31	1.72	0.004	0.003	0.006	0.006	0	0	0

groups of cases and the tendency to increase on successive days corresponding to the increase in the stools. The level of excretion in the urine of the patients without jaundice is higher than in the jaundiced group, as was the case in the stools.

If one examines the figures for the excretion of bilirubin, one finds that all the patients with jaundice showed this pigment in the urine, whereas only five patients without jaundice showed bilirubin (and that only in traces). It should be recognized that these figures do not represent all the bile pigment present in the urine but only that reacting to Erlich's diazo reagent. Rabinowitch[2] has shown that there are other bile pigments in the urine. However, in this study, the quantitative measurements of bile pigment excretion in the urine (apart from urobilin) are not of importance.

SUMMARY

We have conducted a series of investigations upon newborn infants in an attempt to elucidate the conditions upon which the development of icterus neonatorum depends. The results may be summarized as follows:

The average amount of blood destruction in the groups of jaundiced and nonjaundiced infants is essentially the same. The amount of blood destruction in different individuals of both groups, however, varies considerably.

The bile pigment in the blood never gave the prompt direct reaction with the van den Bergh reagent, whether the infants were jaundiced or not.

In practically all patients showing jaundice the indirect (quantitative) van den Bergh reaction showed 5 units or more of bilirubin. Only a few of the patients without jaundice showed more than 5 units of bilirubin in the blood.

Bilirubin was present in the urine of practically all the patients with jaundice. Conversely it was absent in practically all the patients without jaundice. It appears to depend upon the level of bile pigment in the blood rather than upon the presence of a prompt reacting pigment.

The excretion of bile pigment in the stools was studied during the first week of life. High values for urobilin and bilirubin (including biliverdin) were obtained during this period. In the patients with jaundice the average total excretion was lower than in those without jaundice. This was contrary to what one would expect in a purely hemolytic type of jaundice.

The excretion of urobilin and bilirubin in the urine was studied in the same group of cases. As in the stools, the average total urobilin excretion was lower in the patients with jaundice than in the non-

jaundiced group. Bilirubin was present in measurable quantities in all cases with jaundice. In the cases without jaundice it was nearly always absent.

It would appear from the evidence we have brought forward that obstruction of the bile channels plays no part in the production of icterus neonatorum. The jaundice appears to depend upon two factors. The first and basic factor is the excessive hemolysis and resultant increase in circulating bile pigment which takes place in varying degree in all newborn infants. There does not appear, however, to be an excessive hemolysis taking place in the blood of those infants developing jaundice. Some factor would appear to be at work to prevent the excretion of bile pigment in these infants. It may be an increased affinity of certain tissues in these infants for bile pigment. What appears more likely is that the liver cells of these infants have a temporary functional inability to excrete the bile pigment. The histologic observations of Snelling[3] lend support to this thesis. Possibly the prevalence of jaundice in the premature infant may be due to the immaturity and consequent functional disturbance of the liver cells.

REFERENCES

1 Goldbloom, A., and Gottlieb, R.: Am. J. Dis. Child. 38: 57, 1929.
2. Rabinowitch, I. M.: J. Biol. Chem. 97: 163, 1932.
3. Snelling, C. E.: J. PEDIAT. 2: 399, 1933.

APPENDIX: METHODS

Determinations were performed upon twenty-four-hour specimens.

Bilirubin in Urine.—Godfried's modification of Hunter's method. Precipitate bilirubin with $(NH_4)_2\ SO_4$ and $BaCl_2$, wash with water and add 2 c.c. absolute alcohol, 1 c.c. saturated $(NH_4)_2\ SO_4$, 1 c.c. 6 per cent Na_2HPO_4 and ½ c.c. diazo reagent, stirring well after each addition. After color is developed, add 1 c.c. $CHCl_3$, centrifuge and read pink $CHCl_3$ layer against standard $CoSo_4$ by dilution.

Calculation.— $\frac{1}{1000} \times$ dilution of standard $\times$ total volume of urine $=$ mg. bilirubin/twenty-four hours.

Fouchet's qualitative method for total bile pigment was also used to confirm the positive or negative result. Precipitate the bilirubin as above and filter. To the filter paper add 1 drop Fouchet reagent. A blue or green color denotes the presence of bilirubin.

Urobilin in Urine.—Joseph's modification of Adler's method. To 5 c.c. urine add 1 drop iodine (to oxidize urobilinogen to urobilin) and 5 c.c. saturated ZnAc in alcohol. Filter. Green fluorescence in the filtrate indicates urobilin. Add drop by drop to 15 c.c. "standard diluting fluid"* until the fluorescence matches 1/30,000,000 acriflavine, equivalent to 2 mg. urobilin diluted with 2 liters of diluting fluid.

Calculation.—$\text{Total vol. urine} \times 2 \times \frac{15 \text{ c.c. plus c.c. filtrate}}{\text{c.c. filtrate}} \Big/ 2000 =$ mg. urobilin/24 hours.

*2000 c.c. 60 per cent alcohol; 50 gr. ZnAc; 10 c.c. conc. HCl.

Bilirubin in Meconium and Stool.—Evelyn photoelectric colorimeter modification of Hooper and Whipple's method for total bile pigment. To the total specimen add 100 to 200 c.c. water and stir with a mechanical stirrer until a homogeneous emulsion results. Note total volume. To 10 c.c. add 40 c.c. Hooper and Whipple's oxidizing reagent,* to another 10 c.c. portion add 40 c.c. ethyl alcohol. When first solution is blue green and all the stool particles are strongly colored, filter both solutions into colorimeter tubes and read the blue green color in the colorimeter using the alcohol tube as a blank.

Calculation.—Mg./c.c. of bilirubin in the solution are obtained from a calibration curve for the instrument with pure bilirubin. Multiply by cubic centimeters total stool emulsion.

N.B. Principle of Evelyn photoelectric colorimeter.

The instrument consists essentially of five (5) parts.

1. Constant light source.
2. Filter to transmit only the light from that part of the spectrum in which our colored test solution has its maximum absorption.
3. Colored test solution which absorbs the selected light according to the quantity of color present.
4. Photoelectric cell which generates an electric current proportional to the amount of light which finally reaches it.
5. Galvanometer which registers the amount of current by the photoelectric cell.

Urobilin in Meconium and Stool.—Modification of Joseph's method. To 10 c.c. stool emulsion (cf. bilirubin in stool) add 1 c.c. saturated $(NH_4)_2\ SO_4$ 5 c.c. 20 per cent $SrCl_2$ and water to 50 c.c. This precipitates bilirubin which gives a red or a green fluorescence depending on its dilution. Shake well and allow to stand one to two hours. Filter. Treat filtrate as in determination of urobilin in urine, except that after iodine addition allow to stand one hour.

Calculation.—$\dfrac{\text{Total stool emulsion} \times 5 \times 2 \times \dfrac{\text{15 c.c. plus c.c. filtrate}}{\text{c.c. filtrate}}}{2000}$ = mg. urobilin/twenty-four hours.

*2 c.c. HNO_3; 10 c.c. HCl; alcohol to 500 c.c.

WHITHER

L. R. DeBuys, M.D.
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BEFORE entering upon my address, I wish to express my sincere thanks to you for the privilege you have afforded me of serving you as your president. This office I consider the goal of a pediatric career. It is, I believe, undoubtedly the greatest honor within the gift of our specialty.

In 1935 when I was nominated as your president-elect, I began to worry about my presidential address and what the subject of it would be. With men of the caliber of my predecessors in office, I trembled with the thought of hoping to approach any one of them, by comparison, in my message.

It did not seem right to me to accept such an honor and to give nothing in return. It was with this thought in mind, and after much deliberation that I decided upon the topic of my message of today.

For an organization to be born, to grow, to become strong, and to serve a distinct purpose, to become powerful, and to perpetuate itself, it seems to me is much like the cycle of life in the human being. Particularly is this so in the instance of the American Academy of Pediatrics.

The Academy was born as is the baby. With the Academy, however, we were sure of its sturdy inheritance, because the leading pediatricians in this country were its progenitors.

During its infancy it was carefully guarded and cautiously led through that period when it was most vulnerable.

Then began the period of growth and development, during which time other organizations looked on with interest. We are not much past this period now. At this time we should not develop behavior problems, nor should we permit ourselves to be influenced through flattery, which might retard our progress. Nor should we expose ourselves to infections—external influences—which might undermine our health. We should increase our resistance and gather strength from within as we progress, so that we may not become vulnerable from without.

Our future may be as bright and happy as we may wish to make it, or, we may become unhealthy and be sapped of our vitality.

We must not only think of today, but we should safeguard our future with all the possible precautionary measures, and render ourselves immune to every potential detrimental influence.

In this world of medicine individuals may be divided into successes and failures. There are those who have all they want, while there are

Presidential Address, Seventh Annual Meeting, American Academy of Pediatrics, New York City, June 3, 4 and 5, 1937.

others who are not so fortunate. There are those who are idealists and there are those who are realists. There are those who have attained their goal, are content, and who have known of nothing but success; while there are those who have striven hard with less good fortune, though they have expended greater energy but without successful results. There are those who are blind to the needs of their fellowmen; while there are those who need help. One may go on and on in this train of thought and wonder what can be done about it. If we could put ourselves in the places of our fellowmen and treat them with the same consideration that we would then wish for, we could not go very far wrong. This simple fundamental truth, I believe, if properly applied would produce more happiness and contentment.

I hope that whatever I might say will not be misconstrued, because it is my desire only to call attention to existing conditions which may or may not be known to all of us. If they are not known, attention should be called to them. If they are known, help should be rendered to those needing correction.

A while back I sent a questionnaire to many of our fellow members in the hope of learning what is the real status in pediatrics. This was done because of comments, criticisms and opinions which had been expressed from time to time and which came to my attention.

Those of us who are in the administrative end of the Academy do not always know the thoughts of the rank and file of our membership, and may unwittingly overlook much that would redound to the benefit of the organization. Naturally, the strength of the organization will depend upon the loyalty and support of its membership and this only can be attained by operating the Academy for their benefit.

The response which this questionnaire evoked was marvelous and the frank and honest criticisms which were made were indeed remarkable. I am, therefore, deeply grateful to you for your help, and I sincerely hope that we will all become alert to the needs of the Academy, and appreciate that realism and not idealism must lead us on.

It is an extremely easy matter to allow ourselves through flattery to be influenced to a degree of self-satisfaction, and while in this peaceful slumber to lay aside all precautions and to awaken with our self-respect gone.

There can be no doubt but that the Academy should stand for everything for which it was organized, and that it should cooperate with all the properly constructed organizations; but just so far as it acts in the capacity of a consultant. To take part either directly or indirectly in competition with the members of the Academy is certainly sacrificial to them and destructive to the specialty.

I am sure that no right thinking person would willfully do an injustice to anyone else, but sometimes in a moment of inadvertence, one may err. While we build our castles of the future, let us not forget our

foundations of today, and it may be that while the structures grow the castles may vanish and in their places will arise actual structures, sound and permanent.

Unless the pediatricians of today are made content, it is hardly to be expected that sound pediatricians will be developed for the future. One might say there is no need to worry, but if one will think not only of this generation alone, nor the next, but those to come one is bound to awaken to possible realities.

Economically what can be offered the future pediatrician if some serious thought is not given? If one is to be satisfied with a meager income in the future, why should one consider the extra expense of an education in a specialty, and particularly in pediatrics. This specialty unfortunately is frequently regarded as one which represents the clearing house for the ails of children: a specialty which sends the surgical cases to the surgeon; the orthopedic cases to the orthopedist; the gastrointestinal cases to the gastroenterologist; the skin cases to the dermatologist; the nose and throat cases to the otorhinolaryngologist; the eye cases to the ophthalmologist; the feeding cases to the nutritionalist; the preventive treatment of the infectious cases to the boards of health; and the behavior cases to the psychiatrist and the lay child guidance clinics. That, of course, leaves the pediatrician in the practice of his specialty to nonremunerative honorary positions of the various medical and lay agencies interested in child welfare. And, of course, he must live, dress, eat, he must read, he must join medical societies and pay dues, he must travel to meetings to keep abreast of the times, he must pay taxes of various kinds either visible or invisible, direct or indirect, even if he is not required to pay an income tax. The only question that comes to my mind is where can you find him. You will have to be even more successful than Diogenes, which is very unlikely.

With a survey such as has been made there are naturally the extremists, either the self-satisfied or the hypercritical. Also, there are those who have no need to worry about the revenue to be derived from the practice of the specialty; as well as those who are solely dependent upon the practice of their specialty for their sustenance. It is in this latter group, and especially among them, those whose high sense of loyalty to their ideals, and unquestioned integrity make the problem of the practice of pediatrics a difficulty and hardship to themselves. From the survey, this latter group needs a considerable amount of help, and it must look to the power and influence of the Academy for aid. The Academy must sooner or later realize this and must endeavor to influence those more fortunate of its members, who have undisputed wealth or who have satisfactory salaried positions, to consider the less fortunate and to be generous in their thought, so as to make the burden of these less fortunate lighter, through the efforts of the Academy.

Many problems confront us, not the least of which is the future of pediatrics. Whether state medicine is ahead of us or not, it is not my intention to even make a guess; but it is a sure thing that unless the younger pediatricians and those older ones needing support are given some encouragement, there will be few pediatricians in the future from whom to select leaders, and the specialty will sink to where it was before the days of Jacoby, Rotch, and Holt.

It would be a much easier matter for me to have as my presidential address, remarks which would be complimentary, flattering, inaccurate, and misleading. But, from the revelations of the survey, I must in justice to the membership of the Academy sacrifice myself, if need be, and probably incur some displeasure for my efforts by those, if there be any, who have not yet awakened. If in my attempt to be of some assistance to the Academy I may have been so unfortunate as to have incurred the displeasure of any of my fellow members, I will feel that this loss will be more than offset by the good results which should accrue.

The Academy must be run for the benefit of the many and not for the satisfaction of the few. For is it not true that the many make the Academy possible?

From the questionnaire which was sent out, it was found that only 88 per cent were practicing pediatrics exclusively.

The practice of pediatrics was what it was expected it would be to only 67 per cent of the full-time men; to only 44 per cent of the part-time men; and to only 56 per cent of the rank and file. While the rank and file of the pediatricians constitutes the vast majority in our specialty, and as a larger percentage of them was not reached, these figures show a situation worthy of study and investigation.

Only 72 per cent of the full-time men were satisfied with the position of pediatrics in medicine; only 64 per cent of the part-time men were satisfied; and only 57 per cent of the rank and file were satisfied.

All the full-time men; 94 per cent of the part-time men; and 86 per cent of the rank and file; or 93 per cent of the total number, referred cases.

Ninety-five per cent of the full-time men; 89 per cent of the part-time men; and 86 per cent of the rank and file; or 90 per cent of the total number had cases referred to them.

In other words, there are more pediatricians referring cases to other specialties than there are pediatricians having cases referred to them.

So many and varied were the expressions regarding the future of pediatrics that they are too lengthy to mention here. Of the full-time replies only 33⅓ per cent were favorable; of the part-time replies only 12.8 per cent were favorable; and of the rank and file only 30 per cent were favorable; or, an average of only 20 per cent of the men look favorably upon the future of pediatrics.

These two statements are rather characteristic of the replies:

"I would not advise any young man to go into it now for many reasons. The field is beginning to be overcrowded and is rapidly diminishing in size." And

"There is a place for the pediatrician in the practice of medicine, but he must be independent financially to get the most enjoyment out of it. As a means of a livelihood it is a flop."

Space will not permit enumerating the various problems which are advanced as confronting the practice of pediatrics. Some, however, are so frequently given as to require mentioning: overcrowding; state medicine; socialized medicine; economic problems; overeducation of the public, including nurses, teachers, parents; lack of cooperation of the other specialties, especially the obstetrician; encroachment of the adult internist as well as the other specialists; pauperization of the public by lay health agencies; exploitation of the pediatrician by activities for their own benefit; the question of what should be the age limit for the specialty of pediatrics; whether the pediatrician should limit his work as sharply as he does, in view of the attitude of the other specialties; and the question of whether the pediatrician should be a clearing house for the child.

Some expressions worthy of note follow:

"Free clinics are used for advertising purposes."

"Pediatricians in universities are giving courses of various kinds to the general practitioner to better equip him to compete with the pediatrician."

"There is a very gross and unfair hiatus between the poorly paid-for work done in the home by the pediatrician, and the easily done, well paid-for, convenient service in the hospital by the surgeon."

"Competition with social medicine: Here I think that, like it or not, socialization not only of medicine but of our entire economic life, is gradually coming."

"The age limit for the practice of pediatrics should be from the time the cord is tied and from them on; or when the time arrives when the adult practitioner refers to the pediatrician cases up to the age of puberty, then the upper limit should be puberty."

"How can pediatrics survive in medical schools as a major branch if such a small percentage have hope for its future?"

"When it is noted that a grade A medical school places its contagious service in the Department of Medicine and not in the Department of Pediatrics, where it should be, it is clear that the influence of the Academy has not yet reached the medical schools where it should first have made itself felt."

Some of the problems confronting the pediatrician, besides those already mentioned are: that many public and private agencies are actively competing with the pediatrician; that in many the employees do not limit themselves to the function of their activities, but are practicing pediatrics in competition with the private pediatrician; that the economic crisis resulting from this competition added to the economic problem of administering to those of limited income, apparently darkens the future of the pediatrician, according to the survey; that economic conditions, educational conditions, and conditions arising during

the depression, certainly should bring about some modern interpretation for the specialty of pediatrics; and that whether he should limit his work within the narrow confines which were formerly accepted, or whether he should do some additional work and extend the age limit of his practice.

Some expressions worthy of note follow:

"We keep the skim milk. When we are called the patient is helpless, hopeless, or broke."

"How is he going to make a living?"

"The economic crisis through which we have just passed has made itself felt and many of the barriers of the specialties have been let down. How far they will be replaced is a question."

"Pediatricians have for years been laying the foundation for their own demise. Altruistic, but catastrophic nevertheless, because we have developed competitors not only among our medical men but also among the laity."

"Many people cannot see beyond their own enthusiasm to the pauperization of the individual and the cheapening of health, which 'free' distribution it creates in most instances."

"Present status of the established pediatrist is that of a public health officer for the care and welfare of the infant and child without compensation."

"Much of the public health pediatrics should be devoted to education and not to the performance of medical procedures."

"Economically pediatrists risk doing more and more for less and less until almost everything is done for practically nothing."

"How to give gratuitous service to all organizations organized to give away our services and then have time left to make a living."

"State, county, city clinics, parent teachers association, church organizations, health nurses, are all practicing pediatrics."

"The education of the public, the decreasing morbidity in childhood and the taking over of the work of the pediatrician by the various health organizations, tend, under present conditions, to cast a gloomy outlook for the pediatricians of today, and to discourage developing pediatricians for the future."

Some of the suggestions offered as to what should be done for pediatrics are:

1. "Strict qualification and certification."
2. "Maintenance of high standards."
3. "Give pediatrics the same major standing as the other branches in medical schools. I might add, not only nominally but financially as well."
4. "Properly organize to insure strength."
5. "Adjust pediatrics to modern requirements."
6. "Play ball with other specialties on an equal footing."
7. "Judicious lay education."
8. "Place monetary value on services in health centers, etc."
9. "Make baby at birth a pediatric problem."
10. "Encourage welfare nurses to cease giving diagnoses and medical advice."
11. "Local, state and national departments of health should sell health and not practice medicine."
12. "Ethical publicity."
13. "Aggressive leadership of the American Academy of Pediatrics."
14. "Definition of field and prevention of its interests filtering out to other groups, such as psychiatry, public health, etc."

The suggestions for what should be done for the pediatrician are practically those as are given for what should be done for pediatrics; additionally, however, are mentioned:

1. "Encouragement of cooperation with various health agencies."
2. "Representation of the financially less successful pediatricians in Washington, by the Directioning Board of the American Academy of Pediatrics."
3. "Give greater voice to the rank and file."

Other expressions are:

"Place newly born in the hands of the pediatrician."

"All obstetricians should be kept informed of pediatrician's competency for direct reference."

"Do not be the goat for health departments and lay organizations."

"Finding new fields, such as, growth and development, psychology, social development, early endocrine difficulties, allergy and problems of the adolescent."

"He should be prepared to combine his pediatric practice with one or two additional fields of medicine, such as child psychiatry, obstetrics, internal medicine, or any other branch for which he may be fitted."

"Tighten up pediatric organizations so that free information would not be broadcast indiscriminately to the benefit of one or two individual doctors."

"All pediatricians should be required to have a certificate from the American Board of Pediatrics, and whether he limits his work or not, he should be eligible to fellowship in the American Academy of Pediatrics if he proves himself to be properly qualified to practice the specialty."

"The question of fee splitting which has been deprecated for so long has certainly placed many medical men at a decided disadvantage; particularly is this so with the pediatrician. This has made too great an economic gap between the surgical fields and medical fields in medicine. The public would be far better served and the fees for services more economically adjusted, if the medical men and their surgical operators shared equally in the fees. This holds not only for the pediatrician, but for the adult internist as well."

With regard to the activities interfering with the practice of pediatrics:

Of the full-time men 22.2 per cent believe that local activities; 22.2 per cent believe that state activities; 16.6 per cent believe that sectional activities; and 22.2 per cent believe national activities are interfering with the practice of pediatrics.

Of the part-time men 37.2 per cent believe that local activities; 30.2 per cent believe that state activities; 23.2 per cent believe that sectional activities; and 24.4 per cent believe that national activities are interfering with the practice of pediatrics.

Of the rank and file 33.3 per cent believe that local activities; 28 per cent believe that state activities; 14 per cent believe that sectional activities; and 19.4 per cent believe that national activities are interfering with the practice of pediatrics.

The averages show that 34.4 per cent believe that local activities are interfering with the practice of pediatrics; 28.5 per cent believe that state activities are interfering; and 22.8 per cent believe that national activities are interfering with the practice of pediatrics.

Some interesting expressions follow:

"Health organizations, etc., should limit themselves to educational programs and not to the practice of pediatrics in competition with the pediatrician."

"Adequate social investigation so that the indigent only are helped, and leave that class of individual above the indigent class to serve as a field for the younger pediatrician to get a start."

"To be sure we are all interested in child welfare, and no body of men in this country has given so much time and thought to it as the members of our Academy, but when charitable organizations using Child Welfare as an appeal by which they can raise money for salaries, and pay these salaries to people for going about giving our services away, it is time that some thought is given to the interests of the pediatricians."

Sixteen and two-thirds per cent of the full-time men; 26 per cent of the part-time men; and 15 per cent of the rank and file, believe that there are agencies exploiting the pediatrician selfishly. The following comments are of interest in this regard:

"Too many organizations direct the pediatrist rather than the reverse."

"They are being exploited—whether selfishly or not, I do not know. They permit themselves to be exploited, always have. The agencies, medical schools and dispensaries, and all recent uplift organizations."

"There is one more item on the questionnaire that stimulates me, that of agencies which exploit the pediatrician. I do not think he has been exploited as yet at least, but I think there is a very real danger that he may be, and I think that danger ought to be kept in mind constantly, particularly because it lies disguised in sheep's clothing. It lies latent in certain organizations that are supposedly designed and operated to protect him—one in particular could be the Academy of Pediatrics."

From the foregoing it is evident that there are many problems that confront the Academy, and it would seem that they are of sufficient import as to require prompt and earnest consideration. I make no attempt to offer any solution to these many problems, but I present them to the Academy for it to properly evaluate the suggestions and to take the necessary steps to overcome all the obstacles which might be in the way of the progress of the Academy. In this way only, will the greatest amount of interest, enthusiasm, loyalty and confidence of the pediatricians be gained. It should be remembered that for an organization to prosper it must go forward and be progressive, because stagnation and retrogression are synonymous.

The Academy cannot close its eyes to the future. It must provide and rear its members for the years to come and they must be strong, fearless, uncompromising and fair-minded individuals.

The Academy of Pediatrics holds the key to the future and the specialty will be what organized pediatrics will make it. The many problems confronting it which have to do with today and tomorrow, must be cared for now. The problem of educating the pediatrician which begins in the medical school is one of the most important. Pediatrics should be made a specialty to be respected by the other specialties

and not to be looked upon as a specialty for the young or a young specialty, which terms unfortunately seem now, in many quarters, to be synonymous.

I have presented the pathology and the symptomatology of the specialty from which a diagnosis must be made and treatment instituted by the Academy, and the prognosis will depend upon the accuracy of the diagnosis and the thoroughness of the treatment.

Finally, I want to express my sincere thanks and appreciation to the officers of the Academy who have been most considerate and thoughtful of its welfare and with whom it has been a distinct pleasure for me to have served during my term of office.

Critical Review

THE DEVELOPMENT AND PRESENT STATUS OF PSYCHIATRY IN PEDIATRICS

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UNTIL about a decade ago psychiatry and pediatrics were strangers to each other, or at best casual and superficial acquaintances. They operated in altogether different spheres. The one specialty had little knowledge and understanding of the other's concerns and needs. Both were of necessity preoccupied with the scientific organization of their own materials. There was a time, recent enough to be remembered by many, when the very idea that common interests might exist was equally foreign to both. Yet both evolved in a manner which made an eventual approximation well-nigh inevitable. It has been this writer's privilege to be assigned an active part in this approximation and to see it develop swiftly into an ever closer alliance.

EARLIER PSYCHIATRY AND THE CHILD

Let it be said in all fairness that until not so long ago most psychiatrists knew as little about children from first-hand experience as most pediatricians knew about behavior. Psychiatric studies in the second half of the past century were devoted mainly to the description and codification of full-fledged psychoses of the types commonly observed in mental hospitals. Such conditions are exceedingly rare before the age of puberty, and occupation with children was therefore limited almost entirely to the institutionalized groups presenting low grades of mental deficiency. It is worth recording that neither the four volumes of Kraepelin's monumental work nor Bleuler's classical textbook, even in its latest edition, had anything to say about the psychopathology of childhood. Behavior disorders of children interested the psychiatrists only as they seemed to fit into diagnoses in accordance with classifications devised for adults. Those things that might concern the pediatricians were conspicuous through their absence from the few monographs on "psychic disorders," "mental diseases" or "insanity" of children. This tendency, followed until quite recently, was typically evident in the earlier texts by Emminghaus, Moreau de Tours, Ireland, Manheimer and Strohmayer,[1] which were based wholly on traditional nosologic attitudes.

The first extensive textbooks of child psychiatry were published between 1925 and 1927, one in Italian by De Sanctis and three in German by Cimbal, Ziehen, and Homburger. They are of sufficient historical significance to require a brief account of their trends and contents:

De Sanctis[2] dealt with the pathology and diagnosis of conditions pertaining to the "neuropsychiatry" of childhood. He scorned the modern direction toward "clinical individualism" and clung tenaciously to the old nosographic concept of disease. Complaining that "the study of individual differences causes some to lose the aspect of group characteristics" and that "the investigation of intimate psycho-

dynamics distracts the view of others from the inevitable play of its nervous or, more generally, vital partner," he went to the other extreme of losing sight of personality because of his strict adherence to somatic and localizing preoccupations. Only those disorders which could be interpreted as the symptoms of circumscribed diseases were considered in the 995 pages of De Sanctis' book. The common behavior problems of childhood which are most apt to puzzle the pediatrician in his daily practice, such as food capriciousness, fears, restlessness, sleep disturbances or enuresis, had no place in his "psichopediatria," which he declared to be a young branch of both psychiatry and pediatrics.

Cimbal's monograph[3] contained too many contradictions to be of real value. It played with the misunderstood and misapplied concept of "structural analysis." Nervousness was defined as the sum total of the "dysharmonic actions of the nervous system," as a result of faults in endogenous, endocrine and exogenous structural foundations. The "technique" of examination consisted of elaborate questionnaires but the reader was not told what to do with the answers when he got them. The greatest portion of the discussion of treatment was taken up with minute considerations of drugs and dosages, climatic cures (seashore, mountains), hydrotherapy, diet, and a collection of recipes.

Ziehen[4] offered an excellent summary, supplied with an exhaustive bibliography, of all that had been observed and described as psychopathologic manifestations in childhood, largely by authors adhering to orthodox descriptive psychiatry. According to Ziehen, an abnormally behaved child either had a certain, congenital or acquired, mental disease or was endowed with a certain psychopathic constitution. The disease was either a "defect psychosis" or a psychosis which was not accompanied or followed by impairment of the intelligence. The symptoms of each condition were carefully recorded. However, their mode of onset and development, the personalities of the patients and environmental factors were left untouched. As a whole, the book was an almost literal translation of adult psychiatry into terms of how much of it one might find in children. Ziehen must have proceeded in about the following manner: "My psychiatric readers are, of course, familiar with paranoia, melancholia, hebephrenia, stupor, hysteria, etc., in adults; now let us see how frequently these things are seen in children and how similarly or dissimilarly they manifest themselves." It is obvious that this type of presentation contained very little that could be of practical help to pediatricians.

Homburger's charmingly written lectures[5] on the psychopathology of childhood constituted a veritable museum conducted by a conscientious and sympathetic collector who was not free from a tendency to hoarding. Psychologic, psychiatric, philosophic, and educational theories were discussed at considerable length. The author took great pains to introduce to the reader the work of Karl and Charlotte Bühler and William Stern, association psychology, phenomenology, Gestalt psychology, the characterology of Klages, Kretschmer's types of body configuration, Adler's organ inferiority, Freud's theory of infantile sexuality, Jung's ideas of the father's significance in the destiny of the individual. In fact, everybody's opinions, suggestions, groupings, classifications, hypotheses, and speculations concerning everything connected with the psychology, psychopathology and education of children were given ample space in a mostly conciliatory manner. The circumstantiality of the presentation

and the rather peculiar arrangement (for example, enuresis and suicide are dealt with in two consecutive chapters) make this encyclopedic opus magnum resemble a huge warehouse with overstocked shelves and drawers, with no clear separation into departments, in which each article, valuable in itself, is enveloped in numerous and bulky wrappers. The book has many excellent features; it is the work of a great scholar; it contains an enormous mass of instructive material; it is not at all dogmatic; yet one can hardly expect the busy practitioner to wade laboriously through the entire volume; even if he did so, his efforts would probably result in bewilderment rather than clear orientation.

THE ADVENT OF GENETIC-DYNAMIC PSYCHIATRY

The actual case work which had supplied the background for all those textbooks and monographs had been carried on sporadically. Interest in children was not at all general among psychiatrists. However, the last three decades gradually brought about a remarkable change of attitude. Psychiatrists who had theretofore studied abnormal behavior intramurally in hospitals where they saw mostly extremes and end-products of mental aberrations, broadened the scope of their interests to include the milder personality difficulties of people. No longer satisfied with static-descriptive nosography, they centered their attention on onsets and developments. Nothing was more natural under the circumstances than to go back to the age at which human beings begin to behave and to misbehave.

A few important movements helped to turn the focus on the period of childhood:

In Europe, Sigmund Freud, working with psychoneurotic adults, discovered that many of his patients' symptoms could be traced to early life experiences. He was able to show that phobias, obsessions, hysterical paralyses did not just happen as if coming from a clear sky and were not merely inexplicable manifestations of this or that disease but were rooted in the life histories of the patients themselves. Their origin and evolution could be studied. The patient was no longer viewed solely as he appeared at the moment of the consultation but as the culmination of a lifelong development. It became not only legitimate but highly essential to investigate early happenings, attitudes, and relationships. Psychiatry, for the first time in its history, became aware of the fact that adults had once been children and that childhood events may well have something to do with personality difficulties in later life. Thus the child became an object of psychiatric curiosity, though at first in the main rather from an anamnestic, retrospective point of view.

In this country Adolf Meyer's teachings, shifting the emphasis helpfully from organs and their diseases to patients as improperly functioning persons, whetted the appetite for the study of the personality development of individuals, their abnormal functioning or behavior, and their assets which might be used constructively in helping them to overcome their difficulties. Under his influence, psychiatry in particular and medicine in general have tended to become more humanized, to discard the belief in the supposedly self-sufficient attention to organs, microscopes, test tubes, and prescription pads, to see in the patient a living, feeling, reasoning, sick person and not merely a sick kidney or lung or fractured femur lying between two bed sheets. His objective psychobiology, recognizing man as a mentally integrated individual, has profoundly altered psychiatric thought. With proper respect for anatomic,

physiologic, biochemic and organ-pathologic facts, he accomplished the feat of freeing medicine from the nineteenth-century dictatorship of dehumanized cellular pathology. The consideration of performance, implicit as well as overt, thus no longer needed be left in the realm of philosophic theory and speculation and of academic arm-chair dialectic with conflicting "schools" and "systems." Performance or behavior became, as whole-functions or whole-reactions of a person, a legitimate object of concrete, scientific, biologic investigation, a part of medicine which has the study of the normal and abnormal functioning of the human being as its avowed goal. The facts of the functions of the person, of the "whole," became every bit as "medical" as the facts of the functions of "parts," of organs, organ systems, and their interactions.

This led logically to a reorientation of psychiatry. "Mind" no longer needed to vex the physician as a spiritualistic, animistic, vitalistic, theologic or pseudo-theologic mystery. Nor did it have to be linked up too exclusively and mechanistically (and not less mysteriously) with the cells of the brain. The functions of the mentally integrated individual could be studied soberly with all their physical, psychologic, and sociologic implications as biologic and pathologic facts and events. Abnormal functioning could be studied not only when it was obvious and extreme enough to impress people as "mental diseases" with more or less rigid diagnostic labels, supposedly detached from the ordinary life and development of the patient. What used to be regarded as strict, circumscribed disease entities, came to be viewed as unwholesome performances and reactions of persons, sometimes with a known organic background, very often without such etiology ascertainable, and practically always rooted in personality and environmental factors and the results of gradual evolution. So long as psychiatry dealt with "mental diseases" only, it had little to offer to pediatricians, who in their practice are rarely, if ever, confronted with dementia praecox, manic-depressive psychosis, paranoia, or fulminant hysteria. But once psychiatry had stepped out of the mental hospitals, divorced itself from previous restrictions to the legal concepts of committable "insanity" and "feeblemindedness" and undertaken to deal with all types and degrees of unsound, undesirable human conduct, it ceased to be a self-limited—and much too limited—specialty and was on its way to establish intimate contacts with the everyday practice of medicine. It was no longer confined to the interest in those people whose maladjustments had assumed the proportions of full-fledged psychotic collapses. Any person, adult or child, normal or abnormal, who presented any kind of personality or behavior problem, became entitled to psychiatric investigation and treatment. Just as the pediatric specialist treats a mild common cold as well as asthma and pneumonia, so the modern psychiatrist has learned to treat children with fear reactions, temper tantrums or night terrors, which may be as far from presenting symptoms or danger signals of a psychosis as an ordinary stomach ache may be from presenting a symptom or forerunner of gastric carcinoma.

Thus, due to the development of genetic-dynamic principles, child psychiatry has emerged from the status of being a sporadically considered miniature replica of nosographic adult psychiatry. It has definitely begun to assemble and deal with facts pertaining to the disturbing behavior of children.

MENTAL HYGIENE AND THE CHILD GUIDANCE CLINICS

The nineteenth century has witnessed the discovery of the sources of many infectious, nutritional, and other diseases, and the new etiologic insights brought about the organization of a new field of medical endeavor, that of systematic prophylaxis and public hygiene. These efforts primarily concerned the body only. So long as mental diseases were looked upon as unexplainable events of obscure etiology and uncontrollable course, nothing could be done for their prevention. But when unwholesome performances were recognized as maladjustments growing out of reactions of difficult personalities to difficult situations, the thought of prophylactic psychiatry invited itself for serious consideration. It received its impetus for practical action from an unexpected source.

In 1908, Clifford Beers, an energetic and enthusiastic graduate of Yale University, who himself had gone through a psychotic experience, was led by Adolf Meyer to turn to mental hygiene and decided to devote his organizing talent to the betterment and prevention of mental illness. His book, *A Mind That Found Itself*, the foundation of the Connecticut Society for Mental Hygiene and the formation of the National Committee for Mental Hygiene (1909) ushered in a movement which has since then assumed international significance. In 1930, the governments of more than fifty countries sent their delegates to the First International Congress of Mental Hygiene held at Washington, D. C. The Second Congress is taking place in Paris at the time of this writing, in July, 1937. The development of mental illness and delinquency was to be prevented through educational measures and the earliest possible clearing up of personality disorders, before hospitalization and penalization would become necessary. This attitude resulted in the desire to reach the individual during the formative years of childhood. In the course of time it was learned that it was not desirable nor wise to think always in terms of future psychoses and criminal careers. Children's behavior problems came to be considered worthy of psychiatric attention for their own sake, because they existed and called for adequate guidance and not solely because of what might happen later in life.

In order to help the communities to learn the value and methods of mental hygiene, the Commonwealth Fund set up in 1922 demonstration child guidance clinics in seven of our larger cities (St. Louis, Dallas, Los Angeles, Minneapolis, St. Paul, Cleveland, and Philadelphia). By 1928, more than 500 mental hygiene units had been organized in this country, and at the present time more than 40,000 children are being examined each year. In 1927, an Institute for Child Guidance was established in New York City with the intention "to make possible further study and research in the field of mental hygiene for children; to provide clinical facilities for the training of psychiatrists, psychologists, and psychiatric social workers in practical child guidance work; and to offer additional clinical facilities for thorough study and treatment of children presenting problems in behavior."[6]

It now seems rather paradoxical that during all these enterprises concerning the behavior and mental health of children, the pediatricians and general practitioners were left out and allowed themselves to be left out. As late as in 1931, Ziegler[7] approached 99 physicians with the question, "What do you know about the mental hygiene movement?"

In their answers, 46 declared that they knew nothing; 48 replied, "Not much," "Very little" or, "Only a vague idea," and only 5 were reasonably well informed. Mutual contacts were established between child guidance centers and schools, colleges, juvenile courts, welfare agencies, parent-teacher associations, and sometimes psychiatric hospitals, but the whole subject remained terra incognita as far as the pediatricians were concerned. In one instance, such a clinic was housed for years in a small building on the grounds of a large children's hospital and outpatient department, yet until quite recently it might as well have been separated from the pediatric group by the Atlantic or Pacific Ocean; for not the slightest working connection existed between them. The New York Child Guidance Institute (which closed its doors in 1933) was affiliated with the National Committee for Mental Hygiene, the New York School of Social Work, and the Smith College School for Social Work, but completely disregarded the pediatricians. And, to be sure, this disregard was a mutual one; the pediatricians, as a group, took no notice whatsoever of the existence of the Child Guidance Institute and the child guidance clinics.

WHAT ABOUT THE PEDIATRICIANS?

In 1928, W. I. and D. S. Thomas[8] published a comprehensive review of the then existing studies, organizations, and programs concerned with behavior problems of children. Their book dealt exhaustively with the many varieties of maladjustment, the treatment of delinquency, psychiatric child guidance clinics, community organizations, parent education, and the contributions made and planned by the schools, psychologists, mental hygienists and social workers to the understanding, prevention, and treatment of early personality disorders. The authors, who spared no time nor space to cover the entire field, evidently had no occasion anywhere to include the pediatricians as an active or even interested group. One would, however, be greatly mistaken if he inferred therefrom that all pediatricians were wholly unaware of the significance of the subject. The truth is that interest among them was as sporadic as it had been among the psychiatrists until about thirty years ago. As far back as in 1889 (and again in 1904), A. Jacobi,[9] one of the pioneers of American pediatries, spoke of the desirability of making use of psychiatric knowledge in his specialty. But at that time there was very little real help to be obtained from psychiatric quarters where familiarity with the problems of children was inadequate. A few pediatricians, realizing the need for better information, therefore set out to discover the field for themselves. Three resulting monographs, by Rachford, Guthrie, and Czerny, are of special historical interest. It would be unfair to expect to find present-day concepts and attitudes in them, remembering that the psychiatric textbooks of child psychiatry, even of a much later date, were devoid of genetic-dynamic considerations. As a matter of fact, the pediatric authors came upon the milder difficulties of children at an earlier time than did the psychiatrists.

Rachford (1905)[10] worked with the concept of "feeble inhibition of nerve energy," which he stated to be "from a clinical standpoint the most important physiological peculiarity of the nervous system in infancy and childhood." The etiology was dominated entirely by gastrointestinal and general systemic bacterial toxemias, autointoxications, chronic anemia, excessive nerve activity and reflex irritation ("made

potent by reason of its connection with an abnormally irritable reflex center''). Thus enuresis was looked upon as a ''true neurosis,'' with age and heredity as predisposing factors, chronic malnutrition, autointoxication, and bacterial poisoning as direct causes, and ''some form of reflex irritation'' as exciting cause. Hysteria was defined as a ''real, not simulated, disease of the cortical centers of the brain, the functions of which are perverted, or wholly or partially lost.''

Guthrie's volume (1907),[11] richly interspersed with quotations from belletristic sources and historical references, stressed the importance of acquiring knowledge of children as well as their diseases, suggested medical treatment of problems formerly relegated to disciplinarians and criticized the tendency to ignore the personalities, ancestry, and environment of children in treating their ailments. His contrast between the ''neurotic temperament'' and the ''unemotional person'' contained a great deal of the elements elaborated later as distinguishing the introvert from the extravert (Jung), the schizoid from the syntonic (Bleuler) or the schizothymic from the cyclothymic (Kretschmer). Much common sense advice was given in many of the chapters, which contain modern-sounding sentences, such as these: ''We may find a clue to children's ill-health, or bad behavior, in the character of their parents, nurses, teachers, and companions. Needless to say, discretion and tact are necessary in following up the clue in the interests of the child.'' Guthrie could not, however, get away from thinking in terms of derangement of coordination between higher and lower centers, defective control of higher over low centers, ''abnormal explosiveness'' or ''exuberant energy'' of higher centers, irritability and exhaustibility of all parts of the cerebrospinal system. Enuresis was regarded as a neurosis which ''seems to be the result of hypersensitiveness of the lumbar centers of micturition, and of deficient inhibitory control on the part of the higher cerebral cortex over the lower centers in the spinal cord.''

Czerny's little book[12] (third edition, 1911), a collection of lectures, showed clearly that some pediatric leaders definitely felt that their specialty had much to contribute to the education of children in the sense of mental hygiene.

Yet in 1928, in this country, the birthplace of Adolf Meyer's teachings, the mental hygiene movement and the juvenile court organization, pediatric interest in children's behavior disorders was still sporadic, and a pediatrician complained publicly[13]: ''There are very few textbooks on pediatrics which emphasize the mental development or mental hygiene. Every orthodox textbook on diseases of children contains several pages describing the different proprietary preparations in infant feeding, yet how few are the lines devoted to the psychology of infancy and childhood.'' As a matter of fact, the 1928 edition of one of the most widely read pediatric texts behaved as if personality problems of children did not exist. Emotional, intellectual, and situational factors were completely ignored. One concession was made to psychiatry: ''Mental retardation in the school child is usually apparent, though borderline cases necessitate careful psychiatric investigation.''

Eight causes were given for enuresis: 1. Excessive acidity of urine. 2. Excessive irritability of the muscular coat of the bladder even when the urine is mildly acid or neutral. 3. Weakness of the sphincter. 4. Reflex irritation from disturbances outside the bladder. 5. Neurotic causes. 6. Vesical calculus. 7. Malformation of the bladder. 8. Spina

bifida occulta. What are the "neurotic causes"? We read: "Children with unstable nervous equilibrium from chorea, epilepsy, and similar conditions are prone to incontinence of urine. Under psychical influences, especially in dreams, the child imagines a convenient place for urination and the reflexes act." That is all. Masturbation was listed among the diseases of the genital organs. Another popular textbook of pediatrics (1927) discussed in 22 of its 922 pages mental deficiency, amaurotic family idiocy, tuberous sclerosis, deaf-mutism, mongolism, cretinism, masturbation, ties, stuttering and stammering, lisping, alalia, disorders of sleep, pavor nocturnus, pavor diurnus, somnambulism, moral imbecility, conduct disorders, personality difficulties (seclusive, hyperactive, hypokinetic, neurotic, emotional, egocentric, inadequate children), and psychotic diseases. In most instances, the sum total of discussion of the "habits" and "traits" did not go beyond ordinary definition as found in a not too thoroughgoing dictionary of the English language. Conduct disorders were dealt with in fully two and one-half lines; here they are: "Conduct disorders do not appear as a 'bolt from the sky.' Premonitory signs of approaching trouble appear early in the life of the child and pass unheeded." Genetic-dynamic considerations were therewith fully exhausted.

There were a few laudable exceptions, to be sure. Volume VII of *Abt's Pediatrics* (1925) devoted about 200 pages to the psychiatric problems of childhood, contributed by leaders in the field (Bernard Glueck, Smith Ely Jelliffe, and Elmer L. Kenyon). Hector C. Cameron, even though neglecting the intellectual factor and forgetting the existence of mental tests, made the valuable text of Garrod, Batten, and Thursfield (second edition, 1929) even more valuable by his enlightened chapter on *Functional Diseases of the Nervous System* (pages 605-651). Cameron is also the author of two readable and helpful monographs[14] which are so far the best presentations of the subject that have been offered by any pediatrician in the English language. They are surpassed only by the work of a German pediatrician, E. Benjamin,[15] whose study (1930) would give distinction to any child psychiatrist. Even though he was too anxious to draw a sharp line between the "normal" and "pathologic" in psychology, his book is the expression of a serious effort to formulate children's behavior difficulties in a manner that tries to do justice to dynamic factors. It will be read with benefit by psychiatrists and pediatricians and invites itself for translation into English.

THE GROWTH OF PEDIATRIC INTEREST IN PSYCHIATRY

History will undoubtedly record the second half of the past decade as the period when sporadic interest of pediatricians in the behavior problems of children gave way to a general desire for the inclusion of the "everyday problems of the everyday child" in the practice and teaching of pediatrics. The example of Ira S. Wile has done much to create this appetite. Crothers[16] felt that "psychiatry and psychology are far from being fads. They are absolutely inevitable parts of the intelligent general practice of pediatrics. The human contacts the pediatrician forms give him enormous advantages over the specialist who is called in after trouble begins. He knows, or ought to know, the character of the parents, how they have succeeded with their other children. . . . There is a strong effort being made to jump over the pediatrician largely because the pediatrician has not been sensitized to the situation. . . . Psychiatrists

and psychologists ought to prepare carefully to educate us. I do not feel that their efforts in this regard are by any means perfect."

Gerstley[17] stated in 1927: "Certain of us are realizing that in prescribing for a child we are treating a child, that this child is being affected by its environment, its home conditions, its schooling, fully as powerfully as by germs of disease, or even more so. From the ashes of malnutrition and contagious disease arise a new group of problems, the so-called behavior difficulties. Is this within the scope of pediatrics? Must the pediatrician devote his time to the study of home conditions, to the influence of the school? Probably yes. He must be sufficiently conversant with the subject to recognize the problems and in case he has not the sufficient therapeutic technique refer the patient to the proper authority. Conditions vary so in the different parts of this country, the spread of pediatrics has been so rapid, unquestionably men will differ greatly as to the boundaries of our subject. Before teaching students one must know what he wishes to teach. For myself, I believe pediatrics is the study of the child as a whole. After some two thousand years we have suddenly awakened to the astonishing fact that the finest object and evidence of our skill is the normal child. We must be prepared to answer questions concerning the general physical and mental health of our patients as well as to correct accidents that occur in the course of his development."

It would be easy to quote from the literature many more examples indicating the readiness of pediatricians to adopt psychiatric insights and methods to serve them in their work with children. After all, by 1930 a considerable amount of factual information had been accumulated and was available. Parents of the private practice classes had been made aware, sometimes by an undesirable type of publicity, of concepts and methods about which they expected advice from their family physicians and pediatricians. The book market and the popular magazines, supplying an ever increasing demand, turned out volumes and articles, much too often written by persons with much enthusiasm but little real knowledge, filling the heads of the laity with a few crumbs of truth and along with this cramming down their throats a weird meshwork of phrases and hypotheses. Their medical advisers who had thitherto kept scornfully or amusedly aloof were not in a position to set them straight about their puzzlements and even scares which some of that literature had succeeded in stirring up. In some of the larger communities, the job of helping parents and their children was carried out by the child guidance clinics and a few psychiatric hospitals. In the smaller towns, they had no one to go to. In 1924, the Child Study Association of America was formed with the aim of training lay leaders for the task of parent education. Parent-teacher groups and educational centers became interested and active in the field of child guidance. The pediatricians could no longer afford to dismiss the whole subject with shoulder-shrugging apathy. They began to listen earnestly to their own leaders who kept reminding them of this new responsibility.

Preparatory to the White House Conference on Child Health and Protection in 1930, the Committee on Medical Care and Protection selected a special subcommittee on Psychology and Psychiatry in Pediatrics, under the chairmanship of Bronson Crothers. The conclusions are important enough to be reported literally:[18]

"The members of this subcommittee are prepared to defend the statement that adequate medical care of the child cannot be given without intelligent attention to any intellectual and emotional difficulties which may be present. The fields of psychology and psychiatry are broad and rather ill-defined and we do not urge doctors in general to become experts in these subjects.

"There is, however, such a thing as psychiatric intelligence which can be achieved by most physicians. The psychiatrically intelligent doctor is, in the first place, familiar with the people doing valid work in his community; in the second place, he is aware of the fact that the child has a personality as well as a body. The personality he defines in a way satisfactory to himself. To our minds the following definition is adequate for purposes of discussion: The individual with all his emotional and intellectual peculiarities trying to realize happiness and efficiency in the environment in which he lives.

"When signs of difficulty arise the psychiatrically intelligent doctor is not bewildered by bizarre behavior or depressed by evidence of sin, but is curious as to motives. He recognizes that the motives can be discovered only by discussion with the child and by study of the human environment.

"For an effective study of personality, to use a rather formal phrase for what is often an informal procedure, the psychiatrist needs two assets. First, he must have an adequate attitude. Patience, curiosity, tolerance, and almost invincible optimism are essential. To this attitude technical resources of a more or less elaborate, but by no means standardized, sort are added.

"The general practitioner must decide whether he regards the maintenance of the attitude as practicable. If he feels that his timetable allows patient and often prolonged conversations he can begin to acquire technical resources. We believe that the technical resources of the doctor should be derived from those of psychiatrists just as the technical resources needed for urologic study should be those of the urologists.

"The members of this subcommittee believe that if doctors in large numbers acquire psychiatric intelligence and become sensitive to the educational implications of the situations which arise in their practice, a new and effective service can be rendered.

"It is quite clear to us that there is no uniform program which will be suitable. No one of us proposes to argue that the medical profession should dictate to home or school. Without question, the home and the school must do most of the work. Psychologists have established a very strong position as directors of education and doctors have no particular authority in this side of child guidance.

"When trouble arises and the individual child is in distress a well-informed and alert physician is the obvious adviser. Unwillingness of doctors at large to acquire the ability to deal wisely with problems involving the personality of the child may lead to transfer of this field to formal organizations or to individuals without medical experience. Such a solution will inevitably diminish both the prestige of the private practitioner of medicine and the interest of his job."

THE MENACE OF PSYCHIATRY?

Thus the way for psychiatry in pediatrics seemed safely prepared. Through the work of educators, psychologists, and psychiatrists a suf-

ficient amount of material seemed to have been accumulated which, so it appeared, might be handed over to the pediatricians on a silver platter. But the pediatricians were rightly cautious. Instead of either "taking it" or "leaving it," they wanted above all clearness. Their healthy, not at all "resistive" but information-seeking, Missourian I-want-to-be-shown attitude contributed a great deal toward clarification of the issue. There was first the futile question of competency to be settled. It took quite some time before it became apparent that the matter of handling children's behavior problems should not be a bone of contention between rivaling groups of specialists, that the emphasis was not to be placed on division of labor but on sharing of labor, that competency was not achieved by being a neurologist, a hyphenated neuro-psychiatrist, a psychiatrist, psychologist, pediatrician, or social worker, but by acquiring adequate information and skill. As Richards[19] once put it: "No one group of society has an exclusive claim on the mental health of childhood. It should be the active concern and intelligent interest of every constructive force in our social organization that comes in contact with the welfare of children." There were some Indian givers who offered to bring psychiatry to pediatricians, telling them at the same time, openly or by implication, that only the blind belief in this or that theory would entitle them to participation. The pediatricians fortunately did not look for a new creed; they asked for concrete, demonstrable facts.

There came understandable complaints. Said Veeder at the White House Conference[18]: "I have a very definite feeling that the psychiatrist and psychologist have contributed somewhat to the pediatric attitude of suspicion, or skepticism. The psychiatrist above all other people with whom I come into close contact has a penchant for obfuscating his thought with a most perplexing, and I feel unnecessarily complicated, verbiage. . . . The psychologists hold such controversial and opposed views that it is exceedingly difficult at times not to turn from them all in despair. The actions of some of the so-called 'clinical psychologists' in practice, as those for example who give advice for a fee, over the telephone, on how to correct the child when he has a tantrum, or when he swears at or 'cusses' his parents at the table, are probably more distasteful to the real psychologist than even to the pediatrician. One feels sorry at times for the sins that are committed in the name of child psychology."

And in 1931 there issued from an eminent pediatrician a big warning blast. Brennemann,[20] a man of long experience and sound judgment, whose word deservedly had a great resonance among his colleagues, declared publicly that "there is not only a menace of psychiatry, but that it is already seriously in our midst." This seeming dissonance proved in reality to be a healthy challenge, a sweeping house cleaning which was even more welcome to the psychiatrists than to the pediatric group which he addressed. Brennemann took no issue with sober, concrete, fact-finding psychiatry. But he turned his well-known esprit on features which were not so much a menace *of* psychiatry as they were a menace *to* sound psychiatry. He castigated the unfortunate and often unskillful overpopularization and oversentimentalization of child psychology, the exclusive use and improper evaluation of certain standardized tests, and the conflicting claims of certain speculative, aggressive, and overbearingly dogmatic "schools." He rightly warned his audience against the resulting "bewildering nomenclature" and "confusion of

theory and authority." Did this deter him from including psychiatric knowledge and insight in the practice of pediatrics? On the contrary; he stated: "The pediatric psychiatrist, or the psychiatric pediatrician, would seem the obvious solution, and there is much evidence that he is in the making." This certainly sounds much more like hope and confidence in what psychiatry can do than like a fear of its menace. He later made that very clear when, in 1935, he declared that he had raised his voice, "*never against psychiatry itself,* but as a protest against the confusing vagaries of some of its proponents and a warning as to their mass effect prematurely let loose upon a too eager lay mind, unable to digest and advantageously assimilate so new, large, and tough a bolus." In his *Practice of Pediatrics,* which he so masterfully edited, Brennemann has given adequate thought and space to the presentation of mental hygiene, mental development and the psychopathology of childhood. In 1932, Plant,[21] a psychiatrist of sound judgment, clear vision, and rich practical experience with children, countered Brenneman's *Menace of Psychiatry* with an equally challenging and thought provoking article which bears the title, *The Promise of Psychiatry.* This was not at all the sort of Pollyannish paradise which in earlier days had been "promised" by enthusiasts who saw mankind freed in two or three generations from all mental illness and delinquency, through a great magic incantation called Mental Hygiene. Plant pointed out to the pediatricians the problems which were results of the growth and groping of psychiatry, of the unsettled questions concerning the relationships of the various disciplines involved in the work with children's difficulties, and of sociologic factors which an ostrich-like burying of heads in the sand will not succeed in removing from this world. Plant's promise was not a promise made by Plant nor by anyone else; it was a promise contained in psychiatry itself: "The promise of psychiatry is the promise that if the pediatrician will address himself to these problems he will face a vista of rare challenge. The promise of psychiatry is that children are more interesting than the diseases of children."

THE PEDIATRIC-PSYCHIATRIC ALLIANCE

To summarize the development until about 1930: About half a century ago, there was no such a thing as child psychiatry. Psychiatrists did not know children, and pediatricians did not know psychiatry. A while later sporadic interests began to focus on behavior difficulties in early life. The introduction of psychodynamic principles, the birth, infancy, and adolescence of the mental hygiene movement and the establishment of child guidance clinics drew the child definitely into the field of psychiatry as an object of investigative curiosity and therapeutic planning. The pediatricians at first assumed an attitude of sometimes inert, sometimes watchful waiting. A few of their leaders saw and welcomed the possibilities in the offing, the majority remained for a time indifferent and even grew skeptical and impatient, mistaking growing pains, the errors occurring in a trial-and-error period and thickets of speculative weeds for "the real thing." But gradually they discovered genuine values and wanted to learn something about them. There came a brief era of good will oratory and get-together conferences, with casual bouquets of roses with extra-sized thorns. Around 1930 the time was ripe for action.

The reader has undoubtedly noticed that all the while the talk had been confined to generalities. Questions of competencies, the menace or promise of psychiatry, the need of "psychiatric intelligence," attitudes and deterrents had been ventilated at considerable length. This might give the false impression that there was no actual material, no "meat," available. But serious workers had already worked with children psychiatrically and piled up a store of palpable, demonstrable, uncontroversial facts about the behavior and misbehavior, whole-functions and whole-dysfunctions of children. The child guidance clinics had made helpful contributions especially to the problems of parent-child relationships. The psychologists, led by Binet in France and Terman in this country, had devised practical systems of psychometric examination. Watson, earlier in his career, had done pioneer work in the study of infantile emotional reactions. German and Austrian educators, led by Heller and Hanselmann, had started a movement of *Heilpädagogik*, which made itself responsible for the investigation and adjustment of inadequate progress and behavior in the school. Gesell at Yale University had worked out objective methods of determining the rate of mental growth in infants. Child psychology had been enriched by Karl and Charlotte Bühler, William Stern, and Hildegard Hetzer. Piaget in France had made brilliant contributions to the knowledge of children's language and ways of thinking. Healy in Boston had given particular attention to the understanding of delinquent children. In special centers, outstanding insights had been gained through daily contact with problem children by Richards in Baltimore, Thom in Boston, David Levy in New York City, Plant in Essex County, N. J., Lurie in Cincinnati, the staff of the Juvenile Research Institute in Chicago, Allen in Philadelphia, Boenheim (a pediatrician), Homburger, Kramer, and Pototzky in pre-Hitler Germany, Heuyer in France, Tramer in Switzerland, and many other investigators, including psychiatrists, psychologists, and social workers. These facts were made available "for distribution." The *Zeitschrift für Kinderforschung*, edited in Germany, offered in its pages, besides original articles, abstracts of all publications devoted to child psychology and child psychiatry. The *American Journal of Orthopsychiatry*, which is now in its seventh year, and the *Zeitschrift für Kinderpsychiatrie*, founded by Tramer in Switzerland in 1934, were given over entirely to papers dealing with maladjustments in children. The American Psychiatric Association, in its last annual session, arranged a special symposium for child psychiatry. In July of this year, a first International Congress of Child Psychiatry was held in Paris.

How was this knowledge, relatively new to the psychiatrists themselves, to be made accessible and useful to the pediatricians? Evidently courteous bows, mutual assertions of good will and the supply of reading matter were not enough. Evidently enthusiasm and the cultivation of "attitudes" without information and study of details, however necessary for preparatory approximation, were not enough. The mountain-pediatrician could not possibly come to Mohammed-psychiatry; so Mohammed, upon special and polite invitation, came to the mountain.

This happened in 1930. Before that time, a few psychiatrists had already made some attempts to reach the pediatricians (and a few pediatricians had made some attempts to reach the psychiatrists). It is not generally known that back in 1911 Von Pirquet, upon assuming the directorship of the University Children's Hospital in Vienna, provided

at his clinic magnificent quarters for a psychiatric observation division and secured for it the services of an eminently capable man, Erwin Lazar. It is true that the collaboration between Lazar and the pediatric hospital group did not go beyond the referral of cases and occasional conferences. But this arrangement certainly contained the nucleus for further approximation. In this country, limited working relationships were established with pediatric clinics and out-patient departments by Kubitschek at St. Louis, Clarke at Rochester, N. Y., Chamberlain at Chicago, and a few others.

In 1930, psychiatric consultation service on a full-time basis was organized at the Harriet Lane Home for Invalid Children, the Pediatric Department of the Johns Hopkins Hospital and University in Baltimore.[22] The main object of the task, as outlined by Adolf Meyer, Edwards A. Park, Stewart Paton, and Ludwig Kast, was "an investigation of the rank and file of patients in the pediatric clinics for the formulation of psychiatric problems, the mastery of which should be made accessible to the pediatrician to serve him as the psychopathologic principles in dealing with children." It has been this writer's good fortune to undertake and continue the Harriet Lane enterprise, which within the past seven years has grown from one person's attempt at self-orientation in the material dealt with as pediatric psychiatry to a busy division accommodating about one-tenth of all children seen in the children's wards and dispensary. As time went on, especially favorable circumstances made it possible to increase space and personnel. The psychiatrist was received by the pediatric staff as a welcome member of the group and at no time did he have occasion to feel that he was an "unwanted" or "rejected child." A whole wing of the clinic building was gradually turned over for his use, and this geographic proximity proved to be of inestimable value. This liaison arrangement of psychiatry in a pediatric hospital offered the following important opportunities:

1. To study and treat the various forms of psychopathologic problems that come to the attention of a pediatric hospital and out-patient department and pediatricians in private practice.

2. To demonstrate to pediatricians the principles and methods of psychiatric examination and treatment.

3. To teach pediatricians how to regard their patients as persons, with varying biographic, environmental and constitutional backgrounds, rather than merely as stereotyped collections of organs.

4. To teach pediatricians how to handle the rank and file of children's personality disorders, which they usually would not and, if properly trained, should not refer to a psychiatrist.

5. To communicate to pediatricians the type of mental-hygiene wisdom that will enable them to establish intelligent interpersonal relationships with children and their families, even in cases that do not present psychiatric problems.

6. To acquaint pediatricians with the community texture and the communal facilities that may be utilized in the therapeutic planning for many of the children who present personality problems.

7. To recognize the personal, educational, and economic factors that may make it difficult for pediatricians, as individuals and as a group, to acquire and use psychiatric insights, and learn how to help them to overcome some of these difficulties.

8. To investigate specific types of personality difficulties and their development and the various types of personality make-up of children, and to organize a follow-up system as a highly important step forward in modern psychiatric research planning.

9. To study the types of psychopathologic problems that are not taken directly to psychiatrists and not commonly seen in child guidance clinics, such as the various forms of reactions to physical illness, behavior problems in infancy, choreic personality disorders, the psychopathologic difficulties associated with asthma, eczema, the so-called functional gastrointestinal disorders, etc.

10. To make the psychiatric understanding of sick and healthy children and their families an integral part of the pediatricians' thinking and acting.

To accomplish these aims, actual case work was done in collaboration with the referring pediatricians. Disturbing, confusing, and useless phraseologies (which this writer abhors as much as any pediatrician) were avoided and discouraged. Psychobiologic facts were investigated and demonstrated, unproved fancies underwent sober and critical scrutiny. Case reports, conferences, discussions, clinical presentations, and lectures offered occasions for practical exchanges of ideas and experiences for teaching and learning; for in this sort of arrangement based on a give-and-take attitude the psychiatrist and the pediatrician both taught one another and learned from one another: Medical men rightly resent the assumed and self-appointed superiority of some psychiatrists who display an I-know-it-all and you-know-nothing arrogance. The pediatric internes spent first one month and later two months working actively in the psychiatric division and learned how to examine problem children, interview parents, formulate therapeutic programs, and perform psychometric tests. They thus acquired both an "attitude" and a "technique." After a few years, the accumulated experience lent itself for the preparation and publication (in 1935) of a textbook of child psychiatry for the use of medical students, pediatricians, and psychiatrists.[23] An elective course was given to fourth-year students of medicine. Thus the psychiatric division became an integral part of the children's clinic, its case work, and its teaching. It not only helped the pediatricians to acquaint themselves with problems of children's behavior, but the internes of the next-door Henry Phipps Psychiatric Clinic were helped to acquaint themselves with the types of issues that confront the child specialist in his daily practice. In this manner, a common ground, a community of interest and a common language, devoid of the lingo of initiates, were established between psychiatrists and pediatricians.

Other liaison clinics, somewhat smaller in extent and not yet ready for teaching activities, were shaped largely after the Harriet Lane pattern at the children's hospital of Columbia University in New York (Langford), at the Hospital for Sick Children in Toronto (Hawk and Griffin), at the University of Leyden, Holland (Wiersma), and at the Iowa State University (Shirley, to begin in September, 1937). LaMar at Cornell and Marian C. Putnam at Yale also succeeded in having close working connections with pediatricians.

In 1935, the Division of Psychiatric Education of the National Committee for Mental Hygiene arranged a conference between pediatricians and psychiatrists at Washington, D. C. Edwards A. Park, Graeme

Mitchell, Henry J. Gerstenberger, Herbert B. Wilcox, Bronson Crothers, Horton R. Casparis, Parker Dooley, and the late McKim Marriott were the actively participating pediatricians. This gathering differed from previous ones in one fundamental feature: It no longer dealt in generalities, but actual accomplishments, real working programs, substantial organizations of concrete work were reported. This writer fully agrees with Brennemann, who finished his foreward to the published proceedings with the words: "One can well wish that your association were so endowed that these proceedings might be sent—let us again be unitarian —not to every pediatrician and psychiatrist, but to every physician in the land."[24]

The American Academy of Pediatrics, under the leadership of Grulee, Veeder, and others, has taken an active interest in the development of child psychiatry and is looking around for practical ways and means to enhance the continuance of its pacific penetration into the everyday practice of pediatrics. In 1936, the Academy introduced a round table conference on childhood psychiatry as a permanent part of its annual meetings. These round tables, conducted in 1936 at Kansas City by Ebaugh, Plant, and this writer,[25] and in 1937 at New York City by Plant, Langford, and this writer, have proved to fill a definite need and given an opportunity for informal and frank ventilation of opinions and constructive criticism. The Academy has also opened invitingly the pages of its JOURNAL OF PEDIATRICS to articles promoting the knowledge and progress of child psychiatry and arranged for annual critical reviews of the subject, of which this article is the first.

THE OUTLOOK

It was not until less than ten years ago that pediatricians and psychiatrists got together in an unemotional manner, trying to study and sift the material of childhood psychiatry to see with what sort of problems pediatricians are confronted, in what manner they can learn something about these problems, and to what extent they can and should make themselves responsible for their treatment. This new trend resulted in having psychiatrists enter pediatric clinics as active members of the group and work together with the pediatricians. The last decade has witnessed a marked shift of attitude among the pediatricians (not only their leaders) from indifference, even actual aversion, or wistful thinking with folded hands, to collaboration and an eager desire to participate intelligently and knowingly in the work with children as personalities as well as with their physical ailments. There are at present several full-time psychiatric clinics in pediatric hospitals, and there is an obvious demand for more.

The millennium has, of course, not been reached. The pediatric-psychiatric alliance that is definitely forming still suffers acutely from the diversity of psychiatric "approaches."

There is one group that insists on solving all problems on the basis of the psychoanalytic theory of infantile sexuality. Even if this theory were a proved fact, which it is not, its practice calls for a preparation that entails a vast expenditure of time and money, which the pediatricians cannot possibly afford. One cannot expect a pediatrician to spend two years and a few thousand dollars in preparation for something which to him must seem far-fetched and fanciful. One cannot expect him to treat children in a manner that would require from the parents similarly vast expenditures of money. Nor can one expect him to analyze for two

years a child who will not eat his carrots, tells fibs, blinks his eyes, bites his fingernails, or does not get along at school.

Another group is very selective with regard to the scope of problems it undertakes to examine and treat. Some exclude the feebleminded, some exclude organic conditions, some exclude the children of "uncooperative" parents. Some, determined to do "intensive" work with children, limit the number to such an extent that the demands of the community cannot be satisfied, and the busy practitioner rightly asks himself whether he can afford the luxury of such limitations in number.

A third group wishes to consider the needs of the community and the practitioner. These people deal relativistically, pluralistically, and realistically with the problems as they arise. They are willing to deal with every difficulty that comes before the physicians, school teachers, social workers and that which confronts the parents and the children themselves. They are aware of the practical issues involved in the pediatricians' needs and time, in the parents' economic status, in the physical, intellectual, emotional, constitutional, and situational features at play in each individual case.

It is this last group which, as experience has shown, has had the greatest appeal to the pediatricians. It is to this group that they are looking for advice and information. The stage for this kind of collaboration has been solidly set.

The development during the next few years will, it is hoped, aim toward the following points:

1. Knowledge on the part of the psychiatrists, individually and as a group, of the problems confronting and puzzling the pediatricians in their everyday office and hospital practice.
2. Dealing with these problems and collaborating with the pediatricians in a language and manner which they can understand, accept, and adapt to their daily practice.
3. Establishment in pediatric hospitals of psychiatric units, preferably on a full-time basis.
4. Opening up facilities for fellowship training in such units.
5. Making child guidance clinics accessible to pediatricians for close collaboration and teaching. (Stanford University Medical School furnishes a fine example of how well this can be done.)
6. Submitting instructive articles of a psychiatric nature to pediatric journals which, there is reason to believe, will be only too glad to publish them.
7. Creation, under the auspices of the American Academy of Pediatrics, of a joint committee of pediatricians and psychiatrists who would follow and guide clinical and educational activities, act in an advisory manner, and try to obtain facilities for fellowship training.

Pediatrics has entered the field of child psychiatry and intends to remain in the field.

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American Academy of Pediatrics

Proceedings

SEVENTH ANNUAL MEETING OF THE AMERICAN ACADEMY OF PEDIATRICS

NEW YORK, N. Y., JUNE 3, 4, AND 5, 1937

Round Table Discussion on Eczema

Chairman: Lewis W. Hill, M.D., Boston, Mass.

Assistant: Beatrice M. Kesten, M.D., New York, N. Y.

CHAIRMAN HILL.—Most dermatologists would agree that the disorder which is commonly called "eczema," whether it be in the infant or adult, consists of a number of different dermatoses of unrelated etiology. Sometimes there is distinctive morphology, so it is possible to determine by inspection that a given eruption is this or that. More often not, as the morphology is likely to be variable, so in making a diagnosis it is usually necessary to take other factors into account, such as the presence or absence of skin tests, the history, and so on.

It is true, however, that probably about 75 per cent of all cases of infantile eczema rest upon an atopic basis. The word "atopic" was originally suggested by Dr. Arthur Coca to designate a condition where there is a predisposition, often determined by heredity, to sensitization with foreign protein, and manifested ordinarily by hay fever, asthma, and eczema. Some allergists use this nomenclature, some do not. Some such designation for this particular group of individuals is imperative, for there are other forms of allergy, the manifestations of which do not correspond to those of this group. This is particularly true in dermatology, for that form of eczema which is in this country commonly called contact dermatitis is dependent upon sensitization—it is allergic—but there is no hereditary influence operative, no antibodies are formed, the offending substances are not proteins, there is no association with hay fever, and ordinarily not with asthma.

So a good designation for the most common form of dermatitis in infants and young children is *atopic dermatitis.*

It is a normal phenomenon for almost any individual to develop antibodies of the ordinary precipitin variety, and a positive intracutaneous skin test, if foreign protein with which he has not before come into contact enters his blood stream. The degree of sensitivity, however, is not high, the antibody formation persists for only a relatively short period of time, and no symptoms are produced. The atopic individual, on the other hand, as he comes into natural contact with various new foreign proteins from time to time either in his diet or environment, may react in a somewhat different manner. Most important of all, he has symptoms. His degree of skin sensitivity is likely to be greater, and his antibodies, which have been called "reagins," possess the power when injected into the skin of a normal individual, of causing a localized specific sensitivity to the corresponding antigen.

When the normal infant takes cow's milk for the first time there is often passage of unsplit milk protein through the intestinal mucosa to the blood stream and

precipitins and a positive intracutaneous skin test may develop. These, however, are of transitory duration only. This phase of sensitivity, if it can be called such, is probably best looked upon as a stage in the development of immunity, and in the normal course of events, after a while is no further antibody formation, no further specific skin sensitivity, and a permanent immunity results. In the atopic infant this normal process is disoriented; transferable antibodies keep on being produced over a long period of time, specific skin sensitivity, often of high degree, persists and eczema develops. This phase of disorientation may last in some infants for only a few months, and during this phase only a few sensitivities may be developed—then the immunologic activities turn into the right road again—proteins which were formerly harmful are no longer so, and the eczema disappears permanently. In other individuals this perverted immunology may persist for years, and so may the eczema, and may have added to it asthma or hay fever. With most atopic babies the first sensitization is to egg white, and it is consistent with the facts to believe that this takes place in utero. Most atopic eczematous infants give positive skin tests to egg white. This is not often of etiologic significance in the production of the eczema, but may be looked upon merely as an index of atopy.

The next food proteins with which the infant comes into contact are those of milk, and the more I see of atopic dermatitis the more important do I think sensitization to these proteins is. If one depends only upon the scratch test to detect milk sensitivity, he will miss it often. In a series of 153 eczematous infants under one year of age, the scratch test was positive in only 17 per cent. In a series of 63 of the same group who had negative scratch tests to milk, 56 per cent had a positive intracutaneous test, and in most of these it was of etiologic importance.

It would certainly be incorrect to assume that all cases of atopic dermatitis in infants are due to milk sensitization, but it is consistent with the facts to believe that it is the most important factor in many of them, and I have had better results in treating them on this basis than with any other single method of therapy. It has been thought that the sensitization is always to lactalbumin alone, and that casein plays but little if any part. I am not so sure of this, and from unfinished work now in progress, am beginning to believe that sensitization to casein is not uncommon. If casein sensitivity is present the futility of evaporated cow's milk and goat's milk in dietetic therapy is at once apparent, for although in evaporated milk the antigenic power of the lactalbumin is somewhat modified by the heating to which it has been subjected, that of the casein is unchanged. The caseins of goat's and of cow's milk are biologically similar if not identical, so in any case of casein sensitivity if one substitutes goat's for cow's milk, he is actually using the same protein that he did before.

This was emphasized by Schloss several years ago. Not enough attention has been paid to it. The lactalbumins of the two milks are biologically dissimilar, although I think that even here crossed reactions may occur. However, if lactalbumin sensitivity alone is present, feeding with goat's milk is indicated, and I think is likely to be much more successful than feeding with evaporated cow's milk. I have not often seen evaporated milk accomplish much in infantile eczema, although there can be no question that it is well tolerated in some other form of milk idiosyncrasy. As a general thing in most cases of eczema with milk sensitivity, I prefer a milk-free diet to either goat's or evaporated cow's milk.

As the atopic infant begins to eat new foods he may become sensitized to them. Next to milk and egg, wheat is the most common offender, possibly because most babies take a large amount of wheat during the second half of the first year, possibly because wheat protein may be an unusually good sensitizer. Of vegetables, spinach and peas are most likely to cause trouble. I have rarely seen eczema caused or aggravated by any one of the fish oils. Positive scratch tests to orange are very

uncommon, but the intracutaneous test is not infrequently positive, and occasionally the skin becomes worse when orange juice is added to the diet, or better when it is omitted.

Besides the foods, environmental allergens such as silk, house dust, feathers, and so on must be considered. It has been said that sensitization to these allergens was very infrequent in infancy and of very little importance. If one depends solely upon the scratch test, he will get only rare reactions to these allergens in infants. For example, in 74 eczematous infants under one year old tested by me by the scratch method, with house dust and goose feathers, there were only two reactions to dust and one to goose feathers. But in 44 tested by the intracutaneous method, there were 31 positive reactions to dust, and 25 to feathers, and I am quite sure that these were specific reactions. Of the etiologic significance of these positive tests I do not feel sure. I have not as yet been able to prove to my own satisfaction that they are of etiologic importance. But they may be; and environmental as well as food allergens should always be taken into consideration. One must bear in mind in dealing with allergic disorders, in infants or adults, what Dr. Walzer has so wisely said: that a positive skin test indicates by no means a certain, but only a possible, etiologic factor. This is even more true of older children than of infants, and I have a very strong suspicion that in many of the older children with eczema who give positive tests to foods, often some if not all of these positive tests have nothing whatever to do with the eczema, and represent merely persistent skin sensitivity which may or may not have been etiologic in the past, but is no longer so. A parallel may be drawn with those patients with hay fever who no longer have it, but who still have a positive skin test to whatever pollen caused the trouble in the beginning. It is likely that this situation may account for the lack of improvement which is all too common in older children when certain foods to which there are positive skin tests are withdrawn.

Atopic dermatitis represents a definite problem in applied immunology, and there seems no question that if we are ever to understand this disorder, our understanding will develop along these lines. Practical results, however, are at present none too good, and in not a few cases the removal of all allergens to which the patient is apparently sensitive does not influence the course of the disease. This is particularly true of the chronic cases in older children and young adults, and of the most severe cases with erythoderma in young infants. It is not true of most infants, however, and many times excellent results are obtained by removal of specific allergens to which the infant gives positive tests, particularly milk and wheat. Some observers believe that although the fundamental base upon which the disease develops is an atopic constitution, the allergens to which the patient is sensitized have nothing to do with the eruption. This conception is supported by those cases which do not improve when all apparently offending allergens are removed, but there is more evidence to refute than to support it. There are so many cases that do improve when specific allergens are removed, that determination of, and removal of allergens to which the patient has specific skin hypersensitivity is at present the best method of immunologic approach, and I expect that we shall all want to adhere to it until something better develops. One cannot feel, however, that the problem is as yet solved, and I do not believe that the removal of specific offending allergens is the ultimate answer to eczema, or to asthma either. Such procedure is merely giving in to an abnormal situation—not overcoming it. When we know how to influence the immunologic processes in atopic individuals so that they will take the direct road of those of normal individuals, instead of becoming stalled in an obscure and offensive side track—when we can attack directly this miscarriage of normal immunology, then only shall we have a satisfactory treatment for the atopic disorders. The longer I struggle with atopic dermatitis, the more respect do I have for it as an adversary and the less for my own attack.

Next to atopic dermatitis, seborrhoic dermatitis is probably the most common eczema-like dermatosis in infancy. In typical cases it can be rather easily distinguished from atopic dermatitis, but it so often becomes eczematized, and atopic dermatitis may have such a variable morphology, that the differential diagnosis is often difficult. Seborrhoic dermatitis probably has nothing to do with allergy, although often associated with it. An uncomplicated case does not give positive skin tests. It has seemed to me that a baby with atopic dermatitis will almost always give positive scratch tests to egg white, or positive intracutaneous tests to milk, or feathers, or house dust. If none of these are positive, the chances are that the baby is not atopic. Seborrhoic dermatitis is likely to begin during the first three months of life, and may be the precursor of atopic dermatitis. It is most often seen in fat, overfed babies. There are certain things about it which suggest a parasitic, others which suggest a dietetic origin. From what I have found in the literature, I am led to believe that nobody is certain of its etiology. I surely am not. It is much more easily cured than is atopic dermatitis, and when it is apparently cured it is really cured, which is not true of the latter.

In adults, fungus infection plays a large part in the group of eczema-like dermatoses. It is not certain how important it is, in infants, for very little work has been done on the subject. A very few undoubted cases resembling eczema, due to infection with the trichophyton group, have been reported, and it has been known for some time that occasionally moniliasis or thrush of the skin may occur in infancy, especially about the genitalia and buttocks. Whether or not other yeast-like fungi, such as cryptococci, are often concerned, either as primary agents or as pathogenic secondary invaders, is an open question. They have often been found in eczema-like lesions, but they so often occur on normal skins that their pathogenicity is hard to determine. When there is infection due to members of the trichophyton group or to *Monilia albicans*, there is usually sensitization as well, as these organisms are strong sensitizers, so that there is likely to be obtained on the intracutaneous injection of an extract of either group of organisms a delayed reaction exactly similar to a tuberculin reaction. Most adults have at one time or another become sensitized to these organisms, so that a positive test is of little diagnostic value. In 1933 I did trichophyton tests on 60 eczematous infants and children, with only two doubtfully positive reactions, so it seemed that trichophyton infection in this group played very little part in eczema. With *Monilia albicans* the results were different. One hundred were tested with oidiomycin, with 15 definitely positive reactions, and in sixty normal controls with no skin lesions there were only two definitely positive and three doubtfully positive reactions. One can only conclude that sensitization to *Monilia albicans* occurs much more frequently in eczematous infants and children than it does in those without eczema. Adding the fact that in most of those with dermatitis who gave positive tests the skin lesions were clinically very suggestive of fungus infection, makes one suspect that monilia infection is not infrequently of importance. This work is by no means conclusive, however, and the whole subject of culturing and identifying fungi is so entirely beyond my scope that I probably should not even talk about it. It has seemed to me, however, from what I have been able to glean here and there, that fungus infections are probably not very common in the ordinary eczema-like dermatoses of infants and children, but that the possibility of such infection should always be taken into account if the lesions are sharply circumscribed and occur around the groins or on the feet or hands. I know of nobody better qualified to discuss the subject of fungus infection than Dr. Kesten, and I am later going to quiz her on it.

Most pediatricians have so much to do with the diet that we have paid too much attention to it in eczema; we must realize that many cases have nothing to do with the diet, but may be due to outside contacts. In adults, contact dermatitis due to epidermal sensitization to innumerable nonprotein substances, such as dyes, the

salts of various metals, essential oils, and so on ad infinitum, is the most common form of eczema. These persons are allergic, but not atopic. They have no specific antibodies in the blood, they do not have hay fever, and rarely asthma, and they do not give positive scratch or intracutaneous tests, but may give positive patch or surface tests. I think one can say without doubt that such eruptions are not so common in infancy and childhood as in adult life, but that they do occur. It must be remembered also that true protein atopens can work by contact, and that if a child is sensitive to the protein of wool or of silk, for example, the rubbing of a wool or a silk scarf about his neck may give him eczema. The skin sensitization to proteins in the atopic individual is of the deeper layer of the skin (the papillary layer), and ordinarily a break in the epidermis or continued rubbing is necessary to enable the atopen to reach the sensitized cells. In rare cases, however, the protein simply laid on the unbroken skin will cause an eruption. In true contact dermatitis the sensitization is of the epidermis, and simple contact is usually all that is necessary to produce an eruption, although the element of rubbing will intensify it. Patch tests are not likely to show much in infants and children. In twenty cases of eczema I did a series of patch tests with five different common soaps, mercuric chloride, olive oil, cottonseed oil, rose geranium oil, and paraphenylendiamine, without any positive reactions whatever.

Furthermore, I have seen a number of patients where it was certain that the eruption was due to contact and rubbing with various articles of clothing, particularly sweaters, scarfs, and snow suits, and have only occasionally been able to obtain positive patch tests with any of them. Such eruptions are likely to appear on the arms and legs and around the neck, and one should in such cases be especially suspicious of the snow suit if the child is wearing one. I do not know whether it is the dye or the coarse wool in these suits that causes the eruption; but they often cause a great deal of trouble. Such eruptions can occur in atopic children, or in children who are entirely nonatopic. The futility of hoping to cure them by removal of wheat, milk, and eggs from the diet, which is so often done, is at once apparent. Removal of all sources of outside local irritation, plus bandaging over some mild salve, will usually clear them up.

And finally, there are some eczematous-like eruptions which do not fall into any of these groups. The child can be proved not to be atopic, his eruption does not suggest a fungus infection or seborrhoic dermatitis, nor can one find any particular external contact that might bring it about. One depends here entirely upon appropriate local treatment.

Such is a brief outline of my present conception of eczema. I am sure it is crude and quite inadequate; I think it will be different as time goes on; I know it leaves much unexplained.

DISCUSSION

CHAIRMAN HILL.—Dr. Kesten, do you think fungus infection is common in young children?

DR. KESTEN.—No.

CHAIRMAN HILL.—Does it occur?

DR. KESTEN.—Sometimes.

CHAIRMAN HILL.—How about epidermophytosis of the feet and hands, as it occurs in adults?

DR. KESTEN.—You do not see it in young infants but it does occur in the two- or three-year-old child.

CHAIRMAN HILL.—Are there any fairly constant morphologic characteristics of fungus infection?

DR. KESTEN.—One should suspect fungus infections of the skin when thrush is present in the mucous membranes. There is often a circumoral dermatitis. The lesions are flat and contain milky fluid. The edges are undermined. Infections of the scalp, or nails of the fingers or toes, are often present. The patches may be indistinguishable from atopic dermatitis. Skin tests should be done on all infantile eczemas whether one is suspicious of atopic dermatitis or not.

CHAIRMAN HILL.—Can fungi be obtained by scrapings?

DR. KESTEN.—It can be done by snipping a vesicle or removing scales without washing or cleaning. Fungi may be grown on honey agar. They are hard to identify. One could send cultures to the mycology department of the United States Department of Public Health.

CHAIRMAN HILL.—Skin testing with oidiomycin in infants is of some help. Do the dermatologists know the cause of seborrhoic dermatitis?

DR. KESTEN.—No, the cause of seborrhoic dermatitis at present is a blank.

CHAIRMAN HILL.—Is it common in babies?

DR. KESTEN.—Very rare. I do not see it often.

CHAIRMAN HILL.—The Germans and the French write a great deal about seborrhoic dermatitis. It is nonallergic. It shows no positive skin tests. There is no eosinophilia. No vesiculation occurs in seborrhoic dermatitis in contrast to the vesiculation in atopic dermatitis, nor is severe itching present. Would you classify such dermatoses in young infants as eczema?

DR. KESTEN.—Yes.

CHAIRMAN HILL.—I am rather inclined to think seborrhoic dermatitis does occur fairly frequently in infants.

DR. STANLEY D. GIFFEN (TOLEDO, OHIO).—What is Cradle Cap if not seborrhoic dermatitis?

CHAIRMAN HILL.—I think it is seborrhoic dermatitis. Dr. Kesten, is there any distinctive morphology to atopic dermatitis?

DR. KESTEN.—The cheeks are red and covered with small vesicles. Later at one and one-half to two years, the skin becomes thickened on the extremities. It becomes more patchy and papules become excoriated. From eight years to adolescence, there may be a rest period and a later return in the ante-cubital and popliteal spaces.

CHAIRMAN HILL.—I should like to add one thing. If a baby itches very severely, the eruption is apt to be atopic. In the two- or three-year-old child this is also true.

DR. J. W. BRUCE (LOUISVILLE, KY.).—What is the earliest occurrence of atopic dermatitis? Does it occur at birth?

CHAIRMAN HILL.—I think not. Seborrhoic dermatitis may be a precursor of true atopic dermatitis. Dr. Glaser, what is your opinion of the scratch versus the intradermal tests?

DR. JEROME GLASER (ROCHESTER, N. Y.).—I believe the scratch test is less sensitive but safer.

DR. KATHERINE BAIN (ST. LOUIS).— We do scratch tests in younger children, intradermals in older children. Skin tests are just an aid, not a positive diagnosis.

CHAIRMAN HILL.—Environmental allergens, such as feathers, dust, and wool, react more satisfactorily in infants to intradermal tests. Egg shows well in scratch tests. The child should be scratch tested first because of the danger of constitutional reactions from intradermal tests. A careful history is essential—intradermal tests are well tolerated with foods the child has been continually eating, and from which he has had no alarming symptoms.

DR. KESTEN.—One could do very well without skin tests.

CHAIRMAN HILL.—More skin tests are done than is necessary but much information may be derived from them, none the less.

DR. JOSEPH WALL (WASHINGTON, D. C.).—Do you make any distinction as to age?

CHAIRMAN HILL.—Dr. Bain has brought that out, the younger the infant the less likely a positive test is to occur.

DR. WALL.—What solution is used in scratch testing for dissolving the protein powder?

DR. BAIN.—I use hundredth normal sodium hydroxide.

DR. KESTEN.—I use tenth normal sodium hydroxide.

CHAIRMAN HILL.—I use normal salt solution.

DR. WALL.—What is the relative value of intracutaneous and scratch tests?

CHAIRMAN HILL.—I think positive scratch tests are more likely to be of etiologic significance than positive intradermals. If scratch testing alone is used, however, many sensitivities will be missed.

DR. THOMAS A. FOSTER (PORTLAND, MAINE).—What is considered a positive skin test?

DR. KESTEN.—A real wheal with itching is considered a positive test. Other manifestations are erythema and pseudopods.

CHAIRMAN HILL.—In infants an area of erythema with a small wheal is more common than a large wheal. It is important not to use too much material in doing intradermal tests.

DR. KESTEN.—Do you ever get constitutional reactions to intradermal tests?

DR. GLASER.—Yes.

CHAIRMAN HILL.—I agree. I have kept away from intradermal testing as long as possible, but now I do not believe one can say that a complete analysis has been made without intradermals. I always do intradermal milk tests.

DR. GORDON MANACE (TORONTO, CANADA).—Is there any use testing for foods before the foods have been started?

CHAIRMAN HILL.—I never could see the point in making large numbers of tests on infants. The infant should be tested with what he is eating plus egg, plus a number of environmental allergens.

DR. GLASER.—Does that apply to the breast-fed?

CHAIRMAN HILL.—Sensitization may occur through breast milk. I suspect that sometimes the sensitization here may be due to human casein, which is antigenically the same as cow casein.

DR. OSCAR REISS (LOS ANGELES, CALIF.).—Of the eruptions of the newborn, can one say whether or not they are atopic?

CHAIRMAN HILL.—I do not know. The skin of young infants does not react as markedly as that of the older child.

DR. GLASER.—In spite of Dr. Ratner's opinion of heredity, I believe the family history is important in planning feeding of the newborn.

DR. P. A. MCLENDON (WASHINGTON, D. C.).—Is it necessary to test infants under six months at all, from a practical point of view? The diet is so limited that elimination can be done easily.

CHAIRMAN HILL.—I have tried to plan a dietary regime eliminating the things one knows are common offenders. I should not eliminate milk without skin tests. The situation is handled much more accurately if skin tests are done; one can, with infants, do fairly well without them, however.

DR. A. S. FINKELSTEIN (NEWARK, N. J.).—In relation to skin tests in nurslings, we tested a group of eczemas to the things which the mother was eating and obtained good results by eliminating those foods to which positive reactions were obtained.

DR. HARRY BLAIR (HAGERSTOWN, MD.).—What can you do with the child that tolerates only one food, as shown by skin tests?

CHAIRMAN HILL.—You have to ignore skin tests and feed him anyhow. Skin tests must not be taken too seriously.

Dr. Bain, will you describe what a passive transfer test is?

DR. BAIN.—One takes blood from a suspected allergic infant. Then the serum is separated and injected into a normal individual. This sensitized area is then tested twenty-four hours later against specific antigen.

CHAIRMAN HILL.—Do you do this in private practice?

DR. BAIN.—No.

DR. KESTEN.—Seldom but sometimes.

CHAIRMAN HILL.—This method is not very practical in private practice, unless one is doing it a great deal, as Dr. Walzer is.

DR. LAWRENCE I. CLARK (TOLEDO, OHIO).—Do you not have to consider that the recipient may be sensitive?

CHAIRMAN HILL.—Yes, you do—this is one of the disadvantages of the method.

Dr. Piness, what do you think of passive transfer in children as a practical method?

DR. GEORGE PINESS (LOS ANGELES, CALIF.).—I believe it has a definite but limited place. In the diffuse eczema of infants, it has a place because it gives more definite information. Passive transfer is only one method of investigation that may be used, if special conditions indicate it.

CHAIRMAN HILL.—What do you think of milk as a sensitizing agent, Dr. Piness?

DR. PINESS.—If we are to take the attitude that milk is a single food, then elimination is easy. My point of view is different. I feel that cow's milk contains many other things than lactalbumin and casein, depending on what the cow's diet has been. We have proved that elimination of offending proteins from the mother's diet improves some cases of eczema and why may not the same be true of cow's milk? One must not consider that lactalbumin or casein are the only offenders. After a few weeks of life, the infant is exposed to all the same things that adults are and unless inhalants are investigated failures are sure to occur. I find that children who are sensitize to milk are sensitize to it regardless of how it is treated.

CHAIRMAN HILL.—Dr. Kesten, what have you to say about milk as an etiologic agent?

DR. KESTEN.—I think it is most important. I think for an infant of an allergic family, one bottle of cow's milk formula from birth on is invaluable in desensitizing against the lactalbumin or casein of milk. "Nonallergic" milks are of great help during the period of desensitization over a period of three to four months.

DR. CLARK.—How is that done?

DR. KESTEN.—By starting with very small amounts of milk and increasing gradually (orally). Desensitization can be accomplished orally as well, if not better than by the subcutaneous method.

CHAIRMAN HILL.—Dr. Bain, how do you feel about "nonallergic" milks?

DR. BAIN.—In mild cases boiled or evaporated milk may be used. In severe cases, the infant has to be put on some milk-free food.

CHAIRMAN HILL.—I have been trying to find out how common casein sensitivity is. I think it is more common than generally supposed. Suppose we agree that many eczematous infants are sensitive to some element of milk. What are we going to do about it? How good is evaporated milk in the treatment of eczema?

(Seventeen of thirty present voted that it is very valuable.)

DR. KESTEN.—I think it is of value.

DR. WALL.—I think it does a large amount of good.

DR. J. W. AMESSE (DENVER, COLO.).—We have found that it is very valuable.

DR. PINESS.—Your question is not clear. You should ask, "how many find evaporated milk of some value?"

CHAIRMAN HILL.—I have become somewhat doubtful as to the virtues of evaporated milk in dealing with infantile eczema. In casein sensitivity, it should do no good. If lactalbumin sensitivity alone exists, it may be helpful. I should certainly prefer it to fresh milk, but have been able to get better results by entire withdrawal of milk.

DR. REISS.—How many feel that changing from fresh to evaporated milk is of value?

(Almost all voted "yes.")

DR. J. MERREL PARKER (ROCHESTER, N. Y.).—The factor of digestibility probably has much to do with evaporated milk being a decided help.

DR. GEORGE J. FELDSTEIN (PITTSBURGH, PA.).—I had an infant one month of age who was put on five-minutes boiled cow's milk and it developed eczema with edema; one-hour boiled milk still gave trouble; evaporated cow's milk still gave trouble. Evaporated goat's milk gave immediate beneficial results. At nine months of age this infant was changed to evaporated cow's milk and now is on whole milk without return of symptoms.

CHAIRMAN HILL.—I agree, but you are talking about goat's milk, and in view of what you have said, why not use evaporated goat's milk as a routine in place of evaporated cow's milk?

DR. PINESS.—I agree that a change to goat's milk is much better when dealing with lactalbumin sensitization.

DR. KESTEN.—When goat's milk fails, I turn to a soy bean preparation.

DR. WARD L. CHADWICK (GRAND RAPIDS, MICH.).—How about the fat content of milk as a cause of eczema?

CHAIRMAN HILL.—Doubtful. In fat overfed infants it may be of some importance, but the majority are not overfed.

DR. STANLEY D. GIFFEN (TOLEDO, OHIO).—What other measures may be taken to modify milk?

CHAIRMAN HILL.—I don't think much can be done by the addition of acid, peptonization, drying, etc.

DR. GIFFEN.—I think added hydrochloric acid is helpful.

CHAIRMAN HILL.—I think as a summary of this discussion on milk that we can all agree that evaporated cow's milk has virtue if sensitivity is not very high. Goat's milk is likely to be of relatively more value and some milk-free food even more valuable if the degree of sensitivity is high.

Have any of you found much difficulty with soy bean foods?

DR. KESTEN.—Diarrhea, or increased number of stools, occurs in about 10 per cent, with excoriation of the buttocks.

CHAIRMAN HILL.—What is the diarrhea due to?

DR. BAIN AND DR. KESTEN.—We do not know.

DR. CHADWICK.—The stool is very bulky.

DR. M. M. MALINER (BROOKLYN, N. Y.).—The diarrhea occurs in the beginning and the tendency is to clear up very quickly.

CHAIRMAN HILL.—How long have any of you fed children on sobee?

DR. MALINER.—One child has been on sobee for five and one-half years.

CHAIRMAN HILL.—That must be a record. My difficulty with it is in the increased number of stools, large and bulky. They are not the watery type, but such stools do cause sore buttocks. Perhaps less soy bean flour, more starch and less olive oil might be used in the preparation of sobee. How about "cemac"?

DR. GLASER.—It is too expensive.

DR. BAIN.—I have used it. The same tendency to diarrhea with some vomiting occurs. It is expensive.

CHAIRMAN HILL.—I think it contains too many things. We can conclude it is not entirely practical, largely on account of its expense.

DR. BAIN.—"Mullsoy" may also be used.

CHAIRMAN HILL.—We have then three milk-free foods that may be used.

DR. AMESSE.—We have overcome the diarrhea by using weak tea instead of water to dilute the sobee.

DR. KESTEN.—I believe a milk-sensitive child should be desensitized while taking a milk-free food. This can be done in three or four months.

DR. PINESS.—I think a milk-sensitive child may spontaneously recover. I do not believe you can build up as good immunity by gradually increasing amounts as is developed by keeping them off of milk. The factor of threshold of tolerance is very important.

CHAIRMAN HILL.—How much good is done by removing fish oils?

DR. KESTEN AND DR. PINESS.—Much good.

CHAIRMAN HILL.—I feel it seldom does good. Does taking cod liver oil away do any good in the absence of a positive skin test to cod?

DR. PINESS.—No.

CHAIRMAN HILL.—If cod liver oil is taken away, what is used?

DR. KESTEN.—Percomorph oil, drisdol, or viosterol.

DR. THOMAS A. FOSTER (PORTLAND, MAINE).—How about vitamin A?

CHAIRMAN HILL.—There is probably enough in milk. If any milk-free food is used, particularly sobee, some extra source of vitamin A should always be given. What has anyone to say about orange juice?

DR. PINESS.—The offending protein is in the pulp and the juice can be removed without getting this protein by hard squeezing and filtering.

CHAIRMAN HILL.—I see very few positive scratch tests to orange but some intracutaneous tests are positive. Why not use cevitamic acid in place of orange juice as a routine? It is just as good.

Dr. Kesten, how important are environmental allergens?

DR. KESTEN.—In infants, environmental allergens are of very little importance. As to wool, though, I am not so sure.

DR. BAIN.—I have thought of it as a nonspecific irritant.

CHAIRMAN HILL.—Infants give many positive tests to dust and feathers but I have never found them to be a very prominent factor in etiology. Their exact status is not clearly proved, but it is a good idea to remove them in so far as possible, from the environment.

DR. KESTEN.—I think wool and silk should be avoided or allergen-proof mattress or pillow covers should be used.

DR. CLARK.—Does rabbit fur enter into sensitization?

DR. KESTEN.—I think so, in older children particularly.

(Dr. Hill showed pictures of infants with erythroderma with the following comment:

"The infant with erythroderma is usually sensitive to milk, egg, dust, and feathers, but the trouble is that removal of these is not likely to do any good. It is best called atopic erythroderma. Does anyone know how to cure it? I do not.")

DR. W. C. FARGO (CLEVELAND, OHIO).—Local application of 1/1000 aqueous solution of merthiolate gives very good results.

CHAIRMAN HILL.—That is the first ray of light I have seen about erythroderma. Do you then regard the skin condition as an infection?

DR. FARGO.—Yes, I do. Oil does them much harm.

(Dr. Kesten showed pictures of contact dermatitis. Several varieties.)

CHAIRMAN HILL.—One should remember that salves or lotions may contain substances to which the patient may become sensitized.

DR. A. W. CHAPMAN (GLENS FALLS, N. Y.).—Many things used in the treatment of impetigo cause contact dermatitis or sensitize to future contact.

DR. KESTEN.—One of the common causes of ringworm in children is ringworm in the kitten. (Picture shown of the ringworm in a child and also of the kitten as demonstrated.)

(Cases of localized eczema in which the trichophyton was isolated were also shown with the following comment: "Trichophyton very often gets into intertrigenous spaces. Ringworm (tinea circinata) is treated with iodine or gentian violet. Fungus infections do look like eczema, particularly moniliasis. Circumoral dermatitis is usually due to thrush. Gentian violet may cure a fungus infection but will have no effect on eczema.")

CHAIRMAN HILL.—X-ray will relieve eczema temporarily.

DR. KESTEN.—I think X-ray should never be used because it will cure an eczema temporarily without helping the underlying cause.

CHAIRMAN HILL.—If someone took away from you all local applications other than six, what would you wish to retain, Dr. Kesten?

DR. KESTEN.—1. Wet dressings of potassium permanganate. 2. 1 or 2 per cent carbolated vaseline. 3. Lassar's paste with or without 2 per cent salicylic acid. 4. Tannic acid, 2 per cent K-Y jelly. 5. Crude coal tar. 6. Phenobarbital.

CHAIRMAN HILL.—How strong is the potassium permanganate solution?

DR. KESTEN.—1. Enough to make water purple. This is used in weeping eruptions to reduce edema and itching and also to combat infection. It is inexpensive. It is used entirely in the exudative type of eczema. 2. Carbolated vaseline quiets itching. No phenol poisoning has been noted with its use. 3. Lassar's paste with salicylic acid is preferable in the nonexudative type. 4. Two per cent tannic acid may also be used. These will benefit mild eczemas but will not help severe eczemas which have to be approached by diet entirely. "Amertan" may be used on thick skins that itch a great deal. 5. Crude coal tar is invaluable. 6. Phenobarbital should be used to keep the child quiet. We have found phenobarbital produces very little in the way of skin rashes.

CHAIRMAN HILL.—I would retain the following six:

1. Boric acid ointment. (10 per cent.)
2. ℞:

Goulard's extract		
Burow's solution	aa.	drachms iv
Aquae	q. s.	ounces vi

3. Schwartz' ointment ℞:

Mercurochrome crystals		grains xx
Aquae		q. s.
Salicylic acid		grains xxx
Vaseline		
Lanolin	aa. ad	ounces ii

4. ℞:

Crude coal tar		
Zinc oxide	aa.	ounces ii
Starch		drachms iv
Vaseline	q. s. ad	ounces ii

5. Compound resorcin ointment (N. F.)
6. Talc.

The first is used for the scalp and for crusting on the face. The second is used in weeping eczemas. The third is used effectively for chronic eczemas except on the face where it may be too irritating. The fourth is used on the face. When skin gets wrinkly then change to compound resorcin ointment (5). The sixth is used for erythroderma.

DR. HOWARD J. MORRISON (SAVANNAH, GA.).—How about the irritation produced from the action of sunlight on the skin when a coal-tar ointment is used?

CHAIRMAN HILL.—I have never observed this.

DR. KESTEN.—Coal tar has to be removed before exposure to sunlight if irritation is to be avoided.

DR. MORRISON.—The coal tar is easily removed with olive oil.

DR. PINESS.—Do you believe in restraint?

DR. KESTEN.—Not very much. I prefer a sedative and plenty of it.

CHAIRMAN HILL.—Do you think much can be accomplished with local treatment?

DR. KESTEN.—Yes, I do think local treatment helps a great deal.

HOWARD J. MORRISON, Savannah, Ga.
HORACE K. TENNEY, Madison, Wis.
Secretaries.

REPORT OF THE COMMITTEE OF REGION II OF THE AMERICAN ACADEMY OF PEDIATRICS ON A SURVEY OF THE CHILDREN'S BEDS IN REGION II

(North Carolina, South Carolina, Virginia, West Virginia, Florida, Louisiana, Kentucky, Georgia, Arkansas, Alabama, Mississippi, Oklahoma, Tennessee and Texas)

1. The data have been divided into the two attached tables: Table I, 194 general hospitals, and Table II, 10 children's hospitals.

2. Since only 44 internes are exclusively assigned to pediatrics in the 194 general hospitals and since an average of six weeks is the length of pediatric service for rotating internes, it is recommended that additional opportunity be created for the training of internes in pediatrics.

3. The 194 general hospitals have an average daily census of 2,411 children and 1,004 newborn infants. Twenty-two of the 36 hospitals, which have an average daily census of 20 or more children in addition to those on newborn infant services, have no pediatric internes. Not only could these 22 hospitals provide excellent training for pediatric internes, but the patients, as well as the pediatric consulting staff, would have better service.

Table I

194 Southern General Hospitals of 100 Beds or More*

	TOTAL NO.	AVERAGE	MINIMUM	MAXIMUM
Children's beds (exclusive of bassinets)	3275	17	2	184
Approximate average daily census of children	2411	12	1	160
Approximate average daily percentage of children in				
Surgery		30	1	100
Orthopedics		14	1	100
Otolaryngology		21	1	90
Pediatrics		35	5	100
Approximate average daily percentage of				
Pay patients		40	5	100
Part-pay patients		20	5	100
Free patients		40	5	100
Pediatricians on hospital staff	641	3	1	25
Pediatricians on hospital staff who are Fellows of the American Academy of Pediatrics	273	1.41	1	12
Pediatricians on hospital staff who have certificates of the American Board of Pediatrics	134	0.6907	1	9
Bassinets for newborn infants under the care of pediatricians	2330	12.0	1	72
Approximate average daily number of newborn infants under care of pediatricians	1004	5.64	1	66

*32 additional hospitals were not recorded.

TABLE I—CONT'D

	TOTAL NO.	AVERAGE	MINIMUM	MAXIMUM
Internes exclusively assigned to pediatrics	44	0.2268	0	4
Assistant residents and residents exclusively assigned to pediatrics	35	0.1804	1	5
Rotating internes assigned to pediatrics for part of their training	443	2.283	1	18
Length of pediatric service for rotating internes		6 wk.	1 mo.	1 yr.
Out-patient pediatric service conducted		33%		
Frequency of out-patient clinics		triweekly	daily	monthly
Approximate average weekly number of pediatric out-patient visits	4683	73	4	660
Internes assigned to pediatric out-patient service		73%		
Average number of staff pediatricians who attend the out-patient clinic		2.17	1	21
Infant feeding clinics		24%		
Frequency of feeding clinics		triweekly	daily	monthly
Internes assigned to infant feeding clinic		50%		
Contagious service		22%		
Clinical experience for internes in communicable diseases		very little		
Social service		24%		
Research		11%		
Laboratory facilities		90%		
Physician in charge of laboratories		70%		
Internes doing laboratory work		15%		
Approximate average annual number of pediatric autopsies		9.113	1	270
Clinical pathologic conferences		44%		
Frequency of clinical pathologic conferences		monthly	weekly	triyearly
Staff meetings		88%		
Frequency of staff meetings		weekly	daily	monthly

4. The 10 children's hospitals with an average daily census of 298 children have only a total of two internes exclusively assigned to pediatrics. They also should provide additional pediatric interneships for the benefit of the patients, pediatricians, and internes.

5. The pediatric service for rotating internes should be increased from the average of six weeks to at least three months. As a rotating interneship is supposed to provide training for a physician going into general practice, it is logical to assume that, as over one-half of his work will be with children, he should have more than one-eighth of his interne training devoted to that field.

6. The 194 general hospitals have an average of three pediatricians on the staff of each hospital, but 12 of these hospitals are without pediatricians. Of the total 641 pediatricians on the staffs of these general hospitals, 43 per cent are Fellows of the American Academy of Pediatrics, but only 21 per cent have certificates of the American Board of Pediatrics. Of the 48 pediatricians on the staff of the 10 children's hospitals, 58 per cent are Fellows of the American Academy of Pediatrics and 27 per cent have certificates of the American Board of Pediatrics. These percentages should be increased.

TABLE II

10 SOUTHERN CHILDREN'S HOSPITALS (EXCLUSIVE OF ORTHOPEDIC HOSPITALS)

	TOTAL NO.	AVERAGE	MINIMUM	MAXIMUM
Children's beds (exclusive of bassinets)	404	40.4	19	75
Approximate average daily census of children	298	29.8	15	51
Approximate average daily percentage of children in				
Surgery		12	1	24
Orthopedics		10	1	33
Otolaryngology		14	4	44
Pediatrics		64	34	100
Approximate average daily percentage of				
Pay patients		15	13	33
Part-pay patients		10	2	46
Free patients		75	36	100
Pediatricians on hospital staff	48	4.80	2	10
Pediatricians on hospital staff who are Fellows of the American Academy of Pediatrics	28	2.80	1	9
Pediatricians on hospital staff who have certificates of the American Board of Pediatrics	13	1.30	1	4
Bassinets for newborn infants under the care of pediatricians	14	1.40	2	12
Approximate average daily number of newborn infants under care of pediatricians	10	1	2	6
Internes exclusively assigned to pediatrics	2	0.20	1	1
Assistant residents and residents exclusively assigned to pediatrics	6	0.60	1	2
Rotating internes assigned to pediatrics for part of their training	3	0.30	1	2
Length of pediatric service for rotating internes		6 mo.	6 wk.	12 mo.
Out-patient pediatric service conducted		70%		
Frequency of out-patient clinics		semiweekly	daily	monthly
Approximate average weekly number of pediatric out-patient visits	835	120	13	250
Internes assigned to pediatric out-patient service		40%		
Average number of staff pediatricians who attend the out-patient clinic		1.3	1	5
Infant feeding clinics		40%		
Frequency of feeding clinics		semiweekly	daily	weekly
Internes assigned to infant feeding clinic		30%		
Contagious service		40%		
Clinical experience for internes in communicable diseases		40%		
Social service		50%		
Research		20%		
Laboratory facilities		90%		

TABLE II—CONT'D

	TOTAL NO.	AVERAGE	MINIMUM	MAXIMUM
Physician in charge of laboratories		80%		
Internes doing laboratory work		30%		
Approximate average annual number of pediatric autopsies		34%		
Clinical pathologic conferences		30%		
Frequency of clinical pathologic conferences		semimonthly	weekly	monthly
Staff meetings		80%		
Frequency of staff meetings		monthly	weekly	monthly

7. Only 33 per cent of the general hospitals and 70 per cent of the children's hospitals have out-patient pediatric services.

8. Twenty-four per cent of the general hospitals and 40 per cent of the children's hospitals have feeding clinics.

9. The Committee wishes to recommend that facilities for additional pediatric interne training be provided by the general hospitals and children's hospitals which have an average daily census of 20 patients or more, not so much to increase the number of pediatricians, as their number is approaching the saturation point, but in order that more physicians may obtain adequate training for the pediatric problems of general practice.

10. The Committee wishes to thank the physicians of Region II for their cooperation in completing and returning the questionnaires on the children's beds.

Members of the Committee

Philip Barbour (Kentucky)
W. C. Davison (North Carolina)
L. W. Holloway (Florida)
George W. Lyon (West Virginia)
Madeline A. M. Melson (Arkansas)
A. G. Quinn (Tennessee)
M. Hines Roberts (Georgia)
Edwin G. Schwarz ((Texas)
D. Lesesne Smith (South Carolina)
J. B. Stone (Virginia)
Robert A. Strong (Louisiana)
Wm. M. Taylor (Oklahoma)
Stewart H. Welch (Alabama)
R. E. Wilson (Mississippi)

Academy News

The name of Dr. Alexander E. Schefrin, Passaic, N. J., should be added to the last list of those elected to fellowship of the Academy.

The next meeting of Region I of the Academy will be held at Boston, Mass., on Nov. 12 and 13, 1937.

Region II of the Academy will meet on Nov. 30 and Dec. 1, 1937. This meeting will be held jointly with the Section on Pediatrics of the Southern Medical Association at New Orleans, La.

The next meeting of Region III of the Academy will be held at the Lake Shore Athletic Club, Chicago, Ill., Nov. 4, 5, and 6, 1937.

Region IV of the Academy will meet Nov. 4, 5, and 6, 1937, at Los Angeles, Calif.

News and Notes

The following physicians have been certified by the **American Board of Pediatrics** since the last report. Thirty-eight of these doctors were examined.

Joseph Battaglia, Brooklyn, N. Y.
James E. Bowman, Philadelphia, Pa.
Jacob Brem, Boston, Mass.
Claudius Virgil Calvin, Bridgeport, Conn.
Paul Dennison Clark, Burlington, Vt.
Clement B. P. Cobb, New York, N. Y.
Moses Cooperstock, Marquette, Mich.
A. Mordecai Cowan, Cleveland, Ohio
Albert Graham Davis, Utica, N. Y.
Charlotte Fisk, Madison, Wis.
Maurice M. Fliess, Clifton Forge, Va.
Harold J. Freedman, Boston, Mass.
Fred S. Gachet, Rochester, N. Y.
Alice Lilian Arnold Gilbert, New York, N. Y.
Elizabeth Ross Harrison, New Haven, Conn.
John Mark Higgins, Sayre, Penn.
Hugh Francis Leahy, Albany, N. Y.
Pascal Francis Lucchesi, Philadelphia, Pa.
Claire Cutten Manwell, Northampton, Mass.
Theodore Melnick, Philadelphia, Pa.
Isaac J. Muldawer, Philadelphia, Pa.
Nelson Newmark, Springfield, Mass.
Leonard Parente, New Haven, Conn.
David Stewart Polk, Rosemont, Pa.
Donald Dunn Posson, Rochester, N. Y.
Thomas Ryan Quinn, Pittsburgh, Pa.
Gabriel J. Rubin, Boston, Mass.
Harry S. Snyderman, Philadelphia, Pa.
Alfred A. Trivilino, Jamaica, N. Y.
Fred C. Turley, St. Louis, Mo.
Joseph Weiner, New Haven, Conn.
Israel J. Wolf, Paterson, N. J.

Jeanette Hork, Chicago, Ill.
Kenneth Gabriel Jennings, Brooklyn, N. Y.
Robert Emmett Jennings, East Orange, N. J.
Abram Kanof, Brooklyn, N. Y.
Paul Brooks Kreitz, Bethlehem, Pa.
Irving J. Wolman, Philadelphia, Pa.
William H. Baughman, Oakland, Calif.
Jules Blechschmidt, Philadelphia, Pa.
Alcibiades A. Giroux, Duluth, Minn.
Robert Beebe Hauver, Cleveland, Ohio
Jacques M. Lewis, New York, N. Y.

The annual meeting of the **Advisory Board for Medical Specialties,** which is the coordinating board of the twelve certifying boards in the various specialties, the Association of Medical Colleges, the American Hospital Association, the Federation of State Medical Boards of the U. S. A., and the National Board of Medical Examiners was held at Atlantic City, N. J., on June 6, 1937.

The following officers were elected: Willard C. Rappleye, M.D., president, New York, N. Y.; W. P. Wherry, M.D., vice president, Omaha, Neb.; Paul Titus, M.D., secretary-treasurer, Pittsburgh, Pa.; W. B. Lancaster, M.D., Boston, Mass., and R. C. Buerki, M.D., Madison, Wis., executive committee.

Dr. Louis B. Wilson, Rochester, Minn., the retiring president of the board, was elected an emeritus member of the board.

The **American Board of Pediatrics** announces examinations in connection with the following meetings:

Chicago, Ill.—Following the meeting of Region III of the American Academy of Pediatrics, Sunday, Oct. 17, 1937.

Los Angeles, Calif.—Following the meeting of Region IV of the American Academy of Pediatrics, Sunday, Nov. 7, 1937.

Boston, Mass.—Sunday, Nov. 14, 1937, following the meeting of Region I of the American Academy of Pediatrics.

New Orleans, La.—Tuesday, Nov. 30, 1937, preceding the joint meeting of Region II of the American Academy of Pediatrics with the Southern Medical Association.

The Biennial Conference of the National Association for Nursery Education is to be held in Nashville, Tenn., Oct. 20 to 23, 1937. The program has been built around the general theme, "Safeguarding the Early Years of Childhood." Specialists in the fields of medicine, psychiatry, dentistry, anthropology, social work, psychology, and nursing will be present to discuss their individual contributions to early childhood, and to pool these with the findings of specialists in other fields.

At the recent meeting of the American Academy of Pediatrics in New York City, the National Association for Nursery Education had a booth in the exhibit hall.